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This issue of the IASA Journal demonstrates the diversity of our organization and the variety of activities and interests that constitute the international audiovisual archives community. I find myself keenly aware of this dynamism having had the privilege to wade through the entire back catalog of the IASA Journal and its predecessor, the Phonographic Bulletin — now both fully available online as PDFs thanks to the work of George Boston and Richard Ranft. Those who contribute to this journal and those who read the articles herein participate in a discourse that has been ongoing in these pages for more than forty years. These narrative records of our work as audiovisual archivists are a testament to our successes over the past four decades — that we continue to write about our research and our projects demonstrates that we are carrying on our profession and that our archives are still with us.

In this issue, Pio Pellizzari inquires whether we should be preserving or destroying analog content post-digitization. Dave Rice, from the City University of New York, reminds us that obsolescence affects digitization software just as it affects collections materials. Richard Kroon, et al., explain the logic behind the Entertainment Identifier Registry Association (EIDR) and universally unique content identification for audiovisual collections. Two research papers from Canada look at digital preservation approaches to radio and BitTorrent respectively.

Collence Chisita and Forbes Chinyemba share a case study on making audiovisual collections accessible in Zimbabwe, and Gisa Jähnichen explores habits of control of audiovisual collections in Malaysia. Heidi Stalla and Diana Chester, building on an excellent presentation at IASA 2014 in South Africa, discuss the intersection of artists, archivists, and community groups. Dra. Perla Olivia Rodríguez Reséndiz looks at the possibilities of using sound archives to prevent violence in early childhood education in Mexico. Filip Šír, at the Moravian Library in Brno, Czech Republic, closes this issue with a thorough study on early commercial Czech sound recordings.

Throughout the year, I have been working with the IASA Executive Board on three big changes to the IASA Journal that will begin to take shape after this issue. The first change is that the journals will be published in September/October and March/April moving forward in order to align the release of journals with the yearly membership cycle. Receipt of the journal is one perk of IASA membership and we want to make sure that all members receive two full issues each year.

The second and third changes are strategic adjustments to the Journal's operating procedures with the intention of continuing to grow its international reputation and to ensure diverse and clearly articulated viewpoints in each issue.

First, IASA will coordinate a yearly meeting of a newly instituted IASA Journal Editorial Board, the meeting to be held at the IASA annual conference. The Board will consist of the current IASA Editor and President as well as an invited group of representatives from each continent. Representatives will serve 3 year terms on the Board. If a member leaves before the end of the three year term, a replacement will be sought. At the end of the three year term, the current IASA Editor can offer the board member a renewal (3 years) or seek a replacement. Board positions are entirely voluntary and will receive no remuneration or financial support from IASA. There is no requirement that all Board members be present at the annual conference.

The second strategic change to the IASA Journal is that the IASA Journal will invite a cache of reviewers to participate in the day-to-day editorial activities of the journal. Reviewers will be invited based on topical specializations and experience. Reviewers are invited to serve for as long as they are willing to serve. The Editor, working from a list of active reviewers, will direct article submissions to specific reviewers based on their experience with a particular topic or field. Reviewers will be asked to provide double-blind peer review, suggesting improvements, corrections, and/or advice for authors, and to recommend the article for publication, revisions, or rejection. The Editor will make all final decisions based on reviewers' feedback and authors' responses. Reviewer positions are entirely voluntary and will receive no remuneration or financial support from IASA. Potential reviewers will be required to submit evidence of previous publication activities (writing samples) and a CV.

This effort does not aim to exclude any authors from submitting to and publishing in the IASA Journal. To the contrary, the spirit of adding review is two-fold: to support our colleagues in letters and sciences who cannot publish with IASA unless peer-review is offered, and to enrich the quality of IASA's output by incorporating a layer of peer critique to the process. The IASA Journal is one of a few outlets that provides contemporary discourse on archival issues that are purely audiovisual. I hope these investments into the infrastructure of the Journal will be a step towards increasing IASA's visibility and ensuring its longevity.

If you have thoughts or concerns about the upcoming changes, please do let me know.

Sincerely, and with kind regards to all —

Bertram Lyons
Editor, IASA

Dear IASA friends and colleagues,

We live in a world of increasingly rapid change. Technology is a primary driver of the digital revolution, and, constantly, it challenges us to adapt at the same speed. To survive we need to be in control and initiate changes where necessary.

In light of this year's conference in Paris, and acknowledging the work done by Bruce Gordon and Xavier Loyant to ensure a successful event, the theme *One for All and All for One* strikes a deep chord for IASA.

We live in an age when NGO's are playing an increasingly important role to help with the dissemination of information and knowledge. Today, NGO's provide a deep sense of connection by assisting their members with the causes they support. This connection crosses into the international arena more easily than in the past and contributes to influencing and shaping the world we know.

Stephen Heintz[1], President of the Rockefeller Brothers Fund cites three primary roles of modern NGO's: the opportunity for self-organising society through voluntary work to promote the values and goals important to the NGO on a larger scale than before; the ability to build creative and productive partnerships across and among the for-profit and public sectors; and finally the opportunity to take on challenges that the public and private sectors disregard or overlook to enable the shared changes that may be needed. In this sense NGO's have the ability to influence policies and force improvements where needed.

IASA has traditionally been a small international NGO, initially promoting the work of sound archivists and later of both sound and audiovisual archivists. Even though small, IASA played an important role in the international sound and audiovisual sector through promoting the preservation of the world's sound and audiovisual heritage — to the point that it became a respected partner in various projects. IASA is also increasingly recognised for setting standards, especially with regard to the technical nature of our work. Despite a small membership, the work done by IASA over the years is truly inspiring.

It is with this in mind that the Board recognises that a) an increase in membership dues and supporter subscription fees can no longer be postponed, and b) for IASA to enhance its role and status, increased membership has become critical.

IASA has always dealt very conservatively with membership dues and supporter subscription fees increases. The Board realised that an increase in dues and fees could no longer be avoided and carefully reviewed and considered appropriate increases for the various categories, taking the global economic climate into consideration. The meeting in Paris will discuss the membership dues increases proposed to you two months ago and will take a vote on the Board's proposal.

For many years our membership has more or less stayed stable at about 400 members. The current Board has set its sights on ways to attract and retain more members. One of the key strategies is to look inward: are our Committees and Sections still relevant; what can we as IASA members do to promote IASA and the work we do? In this context the Board challenges each Committee and Section to initiate a project that will promote the work of IASA more widely than at present.

Against this backdrop, the conference theme *One for All and All for One* resonates for us as IASA members. It demands our continued inspiring involvement — but with the additional element of looking for ways to promote the work we do and, in so doing, to increase our membership base.

1 http://www.ifce.org/pages/envirolink_Articles/5m06/Role.htm

This year's conference marks the first time all sister organisations have been invited to the conference. The important work done by the CCAAA to create a collaborative forum helped to set the tone and I am very pleased by the responses we have received. Most of our sister organisations will attend the conference.

We are also very fortunate to have UNESCO at our conference this year, delivering the keynote speech. The Director-General, Ms Irina Bokova, has agreed to the keynote speech, which will be delivered by the Deputy Director-General, Mr. Getachew Engida. It is a significant symbol of partnership and collaboration and we are honoured to welcome UNESCO to our conference.

I look forward to seeing you in Paris and to engaging in discussions and debates.

Ilse Assmann
President, IASA
September 2015

IN MEMORY OF MARK JONES

Mark Jones was the Manager of the BBC Sound Archives in the 1980s when I became Manager Audio and Cameras at the BBC Open University Centre in Milton Keynes — a new city about 60Km/40 miles north of London. The BBC Open University operation had only just moved from Alexandra Palace — site of the original BBC television studios opened in 1936 — when I joined the centre in 1982. I swiftly discovered that, in addition to running the radio and TV studio and location crews, I was also responsible for the sound tape and disc libraries.

Being in charge of a new store area which required fitting out with shelving and also being new to the problems of storage of AV materials, I sought advice from within the BBC. Mark was the first person that I contacted and he proved to be a ready source of advice and support to me while I was learning about AV library and archive operations. He also introduced me to Helen Harrison, the then Secretary-General of IASA, who was sitting in the Open University Library — about 100 metres away from my desk. Helen arranged for Dietrich Schüller to visit the University and as a result, Mark, Helen and Dietrich "persuaded" me to join IASA.

My involvement with Mark increased when he negotiated the use of a spare editing room at Milton Keynes to copy BBC programmes for placing in the BBC sound archive. The system that the Sound Archive under Mark used was to copy the transmitted tape, with all the tape splices, on to two new, uncut tapes. One copy was monitored while being recorded and this was placed in the archive proper. The other copy was only spot-checked and was the access copy. The idea was that, if a fault was found on the unmonitored access copy, the archive copy was known to be OK.

Mark was a keen supporter of the work of IASA and was the Treasurer from 1993 to 1999. He was elected Treasurer in 1993 with much to clear up after the previous Treasurer had resigned unexpectedly before the end of her term of office. This was a period of some turbulence in the finances of IASA, but Mark brought the association through the turmoil with his characteristic calm and good humour. He left the association in good financial shape when he handed over the job of Treasurer to Pekka Gronow in 1999.

While Mark was an active supporter of IASA and presented a number of papers to the Annual Conference, he was rather notorious for not spending much time sitting through papers that were not of interest to him. He preferred to visit museums and galleries in the conference town. At one Farewell Dinner, he was given a card signed by many of his friends with the message "Wish that you could have been here." He took the joke in good part.

George Boston

AN INTERMITTENT WANDER THROUGH THE PAGES OF THE PHONOGRAPHIC BULLETIN

George Boston, United Kingdom

I have recently finished the task of scanning the sixty-one issues of the Phonographic Bulletin – the predecessor of the IASA Journal. The scanned journals are now available for consultation on the IASA website. The task was not undertaken by me alone: thanks for their help must be given to Richard Ranft, who had the job of tidying up the raw scans, and Bertram Lyons for his help and support. Also to be thanked is Detlef Humbert, the de-facto archivist of IASA's history, who supplied copies of journals missing from my collection.

As I was using a scanner with a document feeder, scanning was not a full-time job. I had time to browse and read some articles. The range of subjects covered by the Phonographic Bulletin is wide. The topics included "craft" subjects such as discography, documentation, technical matters and oral history. The future – and past – of IASA regularly cropped up. There are also many articles about the AV archiving methodologies used in institutions and the state of AV archiving in countries.

Articles that caught my eye included the following selection:

Bulletin 7 July 1973 – Timothy Eckersley provides the first of a number of articles over the years that consider the future of IASA. The article includes a question that is asked in various ways in later editions - "What is a Sound Archive?".

Bulletin 18 July 1977 – David Lance on the role of the National Branches within IASA.

Bulletin 20, April 1978 – Dietrich Loticius expressing sadness at the lost chance to include TV archives within IASA because of the formation of FIAT in 1977.

Bulletin 21 July 1978 – Joop van Dalfsen of NOS in Hilversum writing the Bulletin's first article about the use of computers in AV archives – a subject that grows in future editions.

Bulletin 25 December 1979 – Rolf Schuursma looked back over the eighty years since the founding of the first sound archive in Vienna in 1899 and the first ten years of IASA.

Bulletin 34 November 1982 – carried an article by Klaus Compaan of Philips of Eindhoven about the compact disc. This is a significant article because Mr Compaan was in many respects the Father of the CD.

Bulletin 39 July 1984 – Bill Storm wrote about the rationale and construction at Syracuse University of that rare thing in the AV world – a specially designed audio archive building.

Bulletin 51 July 1988 – in contrast to the paper about the CD by Klaus Copaan, Friedrich Karl Engel of BASF looked back to 1888 and the origins of magnetic tape recording in his article.

Bulletin 55 November 1989 – This edition carried an item by Joanna Bornat about oral history that provoked a response from Joe Pengelly in Bulletin 56. This, in turn resulted in letters from Ronda Jamieson and Joanna Bornat in Bulletin 56.

Bulletin 56 May 1990 – An article by Ray Edmondson entitled "Towards 2000 – A Frightening Future" sparked responses in Bulletin 57 November 1990 from Rainer Hubert and Helen Harrison.

Bulletin 59 November 1991 – Christopher Roads wrote about the key elements in the work of an AV archive – preservation and access. This foreshadowed the creation of the UNESCO Memory of the World Programme the following year which has Preservation and Access as the primary aims of the Programme.

This is only a small selection of the many articles carried by the Phonographic Bulletin from its first edition in 1971 to its 61st and last in 1992. Similar ranges of articles on the many topics that are of interest to the members of IASA are, of course, to be found in the pages of the IASA Journal.

ORIGINAL PHYSICAL RECORDINGS OF AUDIOVISUAL DOCUMENTS: PRESERVE OR DESTROY AFTER DIGITIZING?

Pio Pellizzari, Fonoteca Nazionale Swizzera, Lugano, Switzerland

An animated discussion is now going on about whether — and if so how — original physical recordings of audiovisual documents should be preserved once they have been digitized. There are two main arguments against preserving them, or rather, in favor of destroying them: firstly, many within archival circles believe that digitization resolves most if not all the problems arising in connection with the preservation of documents and that, as a result, only digital storage will subsequently have to be ensured; secondly, the high cost of preserving originals is a strong argument in favor of their destruction. The debate is being spearheaded by radio broadcasters, who basically only need content in digital form for their re-use; given the constant pressure to contain costs, the tendency to want to discard the physical originals is understandable. In this context, Richard Wright, a recognized expert for the preservation of audiovisual documents, is frequently quoted; in his report on "Preserving Moving Pictures and Sound,"[1] he does not seem to set much store by the preservation of originals after digitization.

But the viewpoint from the relatively narrow perspective of the re-use of content should be broadened to the need to preserve and transmit our audiovisual cultural heritage. In his article, Richard Wright explicitly focuses on the digitization of analog audiovisual recordings and the preservation of digital content; he does not discuss the preservation of the originals after digitization — which does not mean that the originals are not important or that they should be discarded. "*The report concentrates on digitization encoding, file formats and wrappers, use of compression, obsolescence and what to do about the particular digital preservation problems of sound and moving images*", (p.1) and further down "*This report describes the techniques needed for preservation planning, digitization and digital preservation of audiovisual content.*" (p.1) His restrictive comment should also be understood in the sense that the article focuses on the digital content of the originals and not on their preservation. To the contrary, as regards the originals, Richard Wright says the following in the same article: "*Keeping the originals is a basic principle of archiving*" (p.6, § 4.1); in this context, he refers to several documents, including Ray Edmondson's key paper (2004), the publication by PrestoSpace (2006) or those of the IASA Technical Committee, TC 03 and TC 04. These papers clearly state that the physical originals of audiovisual documents and the corresponding playback equipment should be preserved as long as possible after the documents have been digitized.

According to Ray Edmondson:[2] "Conserving an original carrier and protecting its integrity means that no information is lost, and all future options for preservation and access are kept open. Many archives have now regretted the premature destruction of originals after making copies that proved to be inferior in quality or longevity. Discarding an original, no matter how many copies have been made, should never be undertaken lightly." (p.56, §6.4.5). Preservation Guide,[3] the PrestoSpace/BBC website — created by Richard Wright himself — dedicates an entire chapter to the preservation of originals; for their part, the authors of IASA publications TC 03[4] TC 04[5] explain repeatedly that: "Because of the potential for improvements in primary and secondary information retrieval and the availability of ever increasing digital resolutions, all transfers should be considered preliminary. Hence the original carriers and suitable play-back equipment must be preserved whenever possible." (TC 03 p.7, § 9) and "As a general principle, the originals should always be kept for possible future re-consultation." (TC 04 p.31, § 5.1.1).

1 Richard Wright, "Preserving Moving Pictures and Sound", DPC TechnologyWatch Report 12-01 March 2012. DPC 2012.
2 Ray Edmondson, *Audiovisual Archiving: Philosophy and Principles*. UNESCO, Paris 2004.
3 http://preservationguide.co.uk/RDWiki/
4 Technical Committee, Dietrich Schüller (Ed.), *The Safeguarding of the Audio Heritage: Ethics, Principles and Preservation Strategy* (IASA TC 03), IASA 2005.
5 Technical Committee, Kevin Bradley (Ed.), *Guidelines on the Production and Preservation of Digital Audio Objects* (IASA TC 04), Canberra, IASA 2009.

The reasons for preserving original audiovisual recordings are obvious. Analog audiovisual documents are artifacts having a specific form and materiality. As a whole, they contain a variety of information: primary information (contents) and secondary information (form, material, labeling, etc., see IASA-TC 03). They are the conduit for over 100 years' history of development and manufacturing of the most diverse formats with their corresponding recording and playback equipment. This history has marked decades of radio and television broadcasting, making it possible in the first place. The type of utilization and other, mostly indirect, information which cannot be conveyed through digitization are lost. Yet this information is essential to the understanding and contextualization of the production and the utilization of the content. From the archiving perspective, the analog originals and the corresponding playback equipment must be preserved — even after digitization — if we are to transmit our audiovisual cultural heritage and its history to future generations.

As regards digitization proper, a few important questions need to be considered, namely: what digitization process was or is applied, what digital archiving formats are available, how can authenticity be assured compared to the original, are there quality controls? Because digitization, digital formats, and format quality are subject to constant technological changes, re-digitization may be necessary in the near future. But above all, owing to the frequent lack of quality control in mass digitization, the originals have to be preserved in order to remedy any errors that may be discovered in the digitization at a later date.

Another problem area relates to the archiving of digitized documents: how safe are our storage systems? Do we have sufficient experience with the different systems and their handling, and with migration and changes in format, to guarantee long-term preservation? How can losses be replaced if the originals no longer exist?

A viable compromise needs to be found between "discard originals after digitization" and "preserve them all." In our opinion, a differentiated approach must be adopted depending on the format of the originals and their reproducibility, i.e. the playback equipment:

Formats: certain formats, such as acetate records or 2" videotapes for example, are at great risk of physical degradation and may soon be readable only once and never again. On the other hand, other formats have proven to be stable and durable, especially when preserved under ideal archiving conditions.

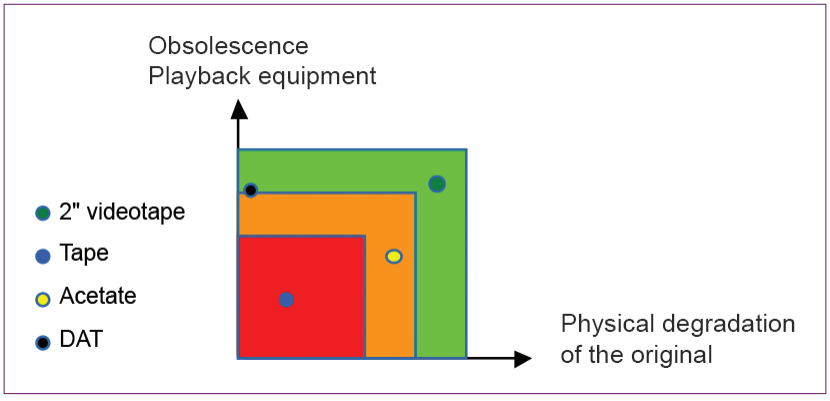
Playback equipment (obsolescence): most playback equipment for physical audiovisual recordings are no longer manufactured; functioning devices are becoming increasingly rare and spare parts are ever more difficult to find. Some of these devices, such as record players for example, could be built again today if necessary; tape recorders and spare parts are still being produced, or being produced anew, especially for sound. The situation is more difficult as regards playback equipment for older formats, particularly equipment that was only briefly manufactured and disappeared quickly from the market; but even here, it would probably be possible to reproduce a playback device. However, there could soon be a more substantial problem with the playback equipment for more recent formats. These devices are quite complex and rely on built-in proprietary software and hardware; the decision to stop their production could create a major problem for the readability of the corresponding formats. An illustrative example was SONY's short-notice decision to stop producing its DAT playback devices and spare parts.

Mass storage systems (digital archives): So far we only have limited experience with the preservation of digital documents, with the various mass storage systems and the migration from one generation to the next. It is therefore advisable to keep originals which can be preserved (see below) at least until sufficient experience has been gathered with the handling of digital formats and storage systems and at least two migrations and a change in technology have been implemented.

In summary, we would observe that the situation of the individual originals and playback equipment, and the combination of the original carrier and relevant playback device vary widely; accordingly, the decision whether to discard or to preserve the original after digitization should be considered on a case by case basis.

A solution might be to prepare a diagram for each format depicting the physical condition of the original as combined with the availability of a suitable playback device. The example below could be helpful in deciding whether or not to preserve an original after digitization.

Example:



The formats in the green section are such physically degraded, or the availability of the playback equipment is so critical, that longer preservation is questionable and subsequent re-digitization hardly possible; the destruction of these originals can certainly be envisaged (e.g., 2" videotapes). It is essential to conduct detailed and documented quality control for all the originals that no longer justify preservation before they are destroyed.

The decision to destroy the formats in the orange section requires careful consideration. Thanks to the advances made in the development of new playback systems, formats which are so degraded that they cannot be played on traditional equipment can now still be saved. The *VisualAudio* or *Irene* systems for replaying acetate records without contact are examples. The formats in the red section must absolutely be preserved at least until they are completely degraded or obsolete and can no longer be reproduced.

Other possibly helpful decision-making criteria may be found by evaluating the contents, through selection or, in the case of documents that have already been selected, through prioritization. The selection or prioritization process is generally conducted before digitization. Basically, this is when one should think about what to do with the originals after digitization.

The research currently undertaken with a view to restore and improve readability (for example, the development of a new method for reconditioning tapes) and thus enhance the quality of the digitization of content is a further argument in favor of preserving the originals.

DIGITIZATION SOFTWARE OBSOLESCENCE, TOO?

Dave Rice, City University of New York (CUNY), USA

Introduction

Audiovisual archivists have long been aware of the impending obsolescence issues surrounding videotape and its associated hardware. The machines, skills, and technological environments that support tape-based video formats evaporate as the larger communities of video broadcasting and production move on to file-based digital environments. Archives are increasingly challenged to sustain local means to access and preserve videotape collections. Although the obsolescence of hardware has been a primary concern, videotape digitization is also dependent on software to facilitate a migration or transformation of data from a videotape to a digital file. The obsolescence of videotape digitization software itself is a secondary technological challenge.

Digitization software, like most video hardware, is designed for and marketed to the larger communities that produce or broadcast audiovisual content. Audiovisual archivists have often adopted such software despite the limitations these present within an archival context. The objectives, methods, and challenges faced by an audiovisual archivist working with deteriorated videotape content are significantly different than the objectives of the production assistant digitizing segments from tape to use in an edit. With a few exceptions, digitization software is streamlined for production use but cumbersome for preservation use. As developers of video digitization software follow their larger user communities away from videotape workflows, archivists encounter obsolescence risks approaching from both sides; as the machines, skills, and services for video hardware become less available, digitization software also deprecates. This downtrend in the market for digitization software for videotape foretells the obsolescence of digitization software at a rate comparable to videotape itself. Just as archivists are challenged to cope with hardware where limited and lessening support is available, this is increasingly true of software.

Although videotape digitization software options may dwindle, other technological advances make other aspects of videotape digitization much more efficient and flexible. Until recently, capturing high quality video required specialized hardware and computers. The high data rates of uncompressed video and audio limited what types of connectivity could be used with videotape digitization. Today's faster connections such as Thunderbolt and USB3 have no trouble transporting uncompressed video at the playback speed, and more modern computers are capable of supporting audiovisual digitization. Despite impending software obsolescence issues, the digitization of archival audiovisual material is increasingly more approachable now than before as digitization systems may now be built without requiring the highest end of dedicated computers.

Digitization Software Options for AV[6]

Software that facilitates migration of audiovisual data from tape to file is developed under a variety of circumstances: some by hardware developers to demonstrate the value and function of their products; some for a more comprehensive set of functions targeted at content creators and editors; some to facilitate the migration of data from a particular type of digital tape to a file; and some within the context of an open source project. Naturally there is overlap between these categories, but in general these categories affect software obsolescence in distinct ways.

6 The software referenced in this section is not intended to be either a comprehensive list or an endorsement, but provided in order to detail appropriate examples of the objectives and development circumstances where audiovisual digitization software can occur.

Specialty Software for Specific Tape Formats

This category includes both proprietary and open source software designed to migrate data from specific digital tape formats. Examples of this software include Live Capture Plus and dvgrab, used for migrating data from DV tape via FireWire, as well as DATXtract, readdat, and ReadDAT X, used for migrating encapsulated PCM audio data from DAT tape via SCSI. This type of software often provides significant efficiencies for the preservation of certain forms of digital tape by focusing on verifiable migration of data rather than digitization. Both DAT and DV tape utilize parity data that may be used by software to assess the accuracy of the data migration.[7] The specifications of the digital formats written on digital tape play a central role in the design and features of this type of software.

Since most data tape formats are no longer used (with the exception of LTO), specialty reading software for these formats have mostly been abandoned. Currently none of the graphical software to read DAT tapes in Mac OS X supports modern Intel processors and instead requires older PowerPC Macs. Documentation for all DAT-reading software is increasingly available solely via the Internet Archive as link rot affects the online information of these tools.[8] While there is still an active Google Group focused on data migration software for DAT tape, datheads2wav, overall such resources for this approach are greatly depleted.

As the use of MiniDV has virtually ceased for recording, the availability of software to transfer MiniDV has been compromised. Some of the most effective software at migrating MiniDV tape, such as Live Capture Plus and dvgrab, are still available online but have not been updated in over 5 years. Squarebox's website lists Live Capture Plus as a "Legacy product - Not recommend for new installations [sic]."[9] In May 2013 the website of the Kino Video Editor, the parent project of dvgrab, listed Kino as "a dead project"[10] and had closed discussion forums.

Betacam SX records a 4:2:2 MPEG-2 stream onto digital tape. For a short time SONY sold the DNE-700 Digital Editing System[11], which included software to facilitate the transfer of MPEG-2 data from Betacam SX to an attached server. The software has been largely unavailable for about 15 years, and no other significant software workflows have been developed to transfer MPEG-2 from Betacam SX to file. Currently the most common migration workflow for Betacam SX in a digital preservation environment is the use of a Betacam SX deck to transcode the MPEG-2 on the tape to SDI for subsequent conversion to a file[12].

Editing / Production Software

Software designed for editing and production is generally the most visible option for videotape digitization with support from the largest communities and resources. Products such as Adobe Premiere and Final Cut Pro were developed by large companies for broad user communities. Video editing software is generally complex and full-featured, while videotape digitization is just a minor component.

Final Cut Pro 7's Log and Capture feature served as a ubiquitous tool in the Mac OS environment for videotape digitization, but the software has not been officially supported by Apple for over 4 years. Some archivists have worked to sustain Final Cut Pro 7 as a means of digitization; however, Apple's transition from 32-bit QTKit to the 64-bit AVFoundation has been a substan-

7 DatXtract will log parity verification errors during data migration. Live Capture Plus record a DV stream from tape to file over Firewire so that the resulting stream may be analyzed for error concealment codes.
8 As an example, see the Internet Archive's capture of Ade Rixon's collection of DAT/DDS info at http://web.archive.org/web/20070828045540/http://homepage.ntlworld.com/adrian.rixon/personal/ade/dat-dds/index.html
9 http://www.squarebox.com/legacy/intlstore.html
10 http://www.kinodv.org/article/archive/0
11 https://web.archive.org/web/20060509224841/http://www.pmotions.com/Public/PDFs/SONY/DNE-700.pdf
12 An hour of MPEG-2 on Betacam SX tape is roughly 8 gigabytes of compressed data. Once decoded and converted to SDI the same hour is roughly 100 gigabytes.

tial revision of Mac OS X's media handling features, which does not prioritize sustaining legacy hardware and workflows. Final Cut Pro X, which supersedes Final Cut Pro 7, does not include the majority of the videotape functions that its predecessor did. Additionally, as Apple's QTKit is phased out in Mac operating system updates, the Log and Transfer interface of Final Cut Pro 7 has become increasingly unreliable on the later versions of the operating system. Some archives that rely on Final Cut Pro 7 for digitization have experienced significant issues as a side effect of upgrading their operating system, often compelling them to revert back to older, unsupported operating systems. Just as the maintenance of most videotape hardware requires the utilization of unofficial, unsupported, and/or creative means to acquire legacy machinery and skills, the maintenance of digitization software is increasingly in need of similar alternative strategies.

Software Accompanying Hardware

The hardware that converts analog or digital video signals to computer inputs, such as the BlackMagic Ultrastudio Express, the AJA io, and OpenCube ingest servers, are accompanied by software that demonstrates their features and facilitates system diagnosis. Digitization hardware from BlackMagic is typically accompanied by software like Media Express, while AJA provides VTR Xchange. Though these applications are not open source and supported only on their associated hardware, both are freely available.

The benefit of this type of software is the ease of use. Both Media Express and VTR Xchange are designed to offer a demonstrative and intuitive user experience, and such applications are entirely focused on transferring audiovisual data between tapes and computers. However, the simplicity of these applications means the options for fine-tuning are limited. For instance, Media Express provides no options to control audio bit depth, allowing only 16 bit audio during recording, even though the hardware itself supports 32 bit audio. Compared to editing software, there are fewer options for audio channel configuration, display aspect ratio handling, and the utilization of codecs. Although this category of software places arbitrary limits on recording options, such software may allow for more efficient workflows.

Open Source Projects

The Österreichische Mediathek has released DVA Profession[13], an open source digitization solution combining tools and workflows for videotape digitization, access, review, and management of digitization projects. DVA Profession facilitates the digitization of videotape by combining several open source projects together in a Windows environment. The approach uses ffdshow-tryouts[14] which adds open source codec libraries as system codecs. With ffdshow-tryouts enabling lossless video codecs at a system level, DVA Profession then uses VirtualDub[15] to facilitate the ingest from SDI or DV inputs through an encoding process to create a representative preservation file. DVA Profession provides scripts to automatically setup VirtualDub according to its preservation recommendations, such as setting the recordings specifications appropriate for the selected video input.

BlackMagic Design, which designs and sells hardware to facilitate the use of audiovisual signals as computer inputs, makes their Software Development Kit (SDK) freely available under an non-restrictive license.[16] Use of the SDK requires an end user license agreement but does not require a non-disclosure agreement or complex partnership as is often required with other hardware vendors. Blackmagic's SDK has enabled many active, open source projects to inte-

13 http://www.dva-profession.mediathek.at/

14 http://dva-profession.mediathek.at/fileadmin/MEDIASERVER/dva-profession-html/documentation/3-installation-manual/32-ingest-clients/index.html#c311 http://ffdshow-tryout.sourceforge.net/

15 http://dva-profession.mediathek.at/fileadmin/MEDIASERVER/dva-profession-html/documentation/3-installation-manual/32-ingest-clients/index.html#c312 http://virtualdub.org/

16 +1 Blackmagic Design

grate with Blackmagic hardware, such as VLC, Shotcut, and FFmpeg. Beyond Blackmagic, many other devices have been integrated into multimedia software frameworks such as FFmpeg.[17] FFmpeg is a comprehensive set of open sources utilities and libraries for handling audiovisual data, including analysis, encoding, decoding, metadata handling, and audiovisual processing. See http://ffmpeg.org/ffmpeg-devices.html#Input-Devices for examples and information on FFmpeg's integration with hardware devices.

While the Blackmagic SDK is a significant building block towards the development of open source videotape digitization software, the libraries and proof-of-concept utilities that comprise the SDK are intended for programmers and developers rather than archivists and preservationists. To facilitate the integration between video hardware, via Blackmagic capture products, and audiovisual frameworks, such as Libav and FFmpeg, there is bmdtools.[18] Bmdtools includes bmdplay and bmdcapture which make the use of the Blackmagic SDK considerably easier. With bmdcapture an operator can select both audio and video bit depth as well as audio channel count, signal standard, and input connection, and send all the resulting data into another tool such as Libav or FFmpeg for further transcoding or playback while recording to a file. Bmdtools enables the use of Blackmagic hardware with substantially more options and flexibly as compared with BlackMagic's own MediaExpress software.

During a Hack Day hosted at the 2014 conference of the Association of Moving Image Archivists, one team focused on the creation of fully functional digitization software.[19] The team combined skills to integrate bmdtools[20], QCTools[21], Blackmagic SDK[22], and ffmpeg[23] within the framework of an XCode project. By the vote of the conference attendees, the project won top honors at the competitive Hack Day by demonstrating the need and interest in the design of videotape digitization software based on open source components.[24]

Also in 2014, the Bay Area Video Coalition (BAVC) applied for and won a competitive Knight Foundation Prototype Grant to research, design, and build an open source application to digitize videotape.[25] The work resulted in the integration of the Blackmagic SDK into their open source quality control application, QCTools. An experimental feature of QCTools can detect Blackmagic hardware and subsequently offer additional options for video capture. After configuring the specifications of the capture, the recording will start and the digitization will render original time-based analytical graphs and thumbnails for review.[26] Presently this feature is still in experimental status and requires optimization and refinements for memory management. The project also resulted in contributions to vrecord[27], a bash script that coordinates the Blackmagic SDK, bmdtools, QCTools and FFmpeg to record videotapes to uncompressed and lossless formats with logging, metadata, and fixity data.

17 FFmpeg is an open source solution to record, transcode, process and analyze audio and video. Its codec and format libraries are widely incorporated into audiovisual software.
18 bmdtools, developed by Luca Barbato is available, at https://github.com/lu-zero/bmdtools
19 Disclosure: the principal author of this document was a member of this Hack Day team
20 http://github.com/lu-zero/bmdtools
21 http://www.bavc.org/qctools
22 http://software.blackmagicdesign.com/SDK/Blackmagic_DeckLink_SDK_10.1.4.zip
23 http://ffmpeg.org
24 Additional info about the project outcome is avialable at http://wiki.curatecamp.org/index.php/Association_of_Moving_Image_Archivists_%26_Digital_Library_Federation_Hack_Day_2014#Hack_day_capture:_GUI_tool_for_BMDCapture.2C_using_FFmpeg_.2B_BMDTools_.2B_BlackMagic_Decklink_SDK and https://github.com/amiaopensource/hackdaycapture
25 http://www.bavc.org/bavc-preservation-awarded-knight-foundation-prototype-fund http://www.knightfoundation.org/grants/201449123/
26 Details and images of this feature in QCTools may be reviewed here: http://htmlpreview.github.io/?https://github.com/bavc/qctools/blob/master/Source/Resource/Help/Recording/Recording.html
27 vrecord is available at http://github.com/amiaopensource/vrecord/blob/master/vrecord

Open Sourcing Digitization

The obsolescence of audiovisual digitization software presents both a challenge and an opportunity. Events such as the end-of-support for software, Apple's transition from QtKit to AVFoundation (and the associated rewrites to QuickTime Pro X and Final Cut X), and the closure of discussion forums related to digitization software, signal that archivists should collectively take further control of the software required for digitization. In recent years there has been increased communal efforts, funding, and progress at building tools for cataloging, processing, collection management, and providing online access to video. The embrace of "open source" within the preservation community has been a blessing, as it has become increasingly easy to share resources, customize existing solutions for local challenges, and solve problems communally. Resources such as JHOVE, Archivematica, Omeka, MediaInfo, BWF MetaEdit and bagit have been developed under open licenses with the participation of archivists and have since found wide-scale deployment.

The values of open source software development are particularly relevant in the creation of software for preservation purposes. Whereas some software may be free in cost, open source software allows freedom for modification, invention, and collaboration. In a similar way to how archivists share workflows for videotape baking or videodeck modifications to meet preservation challenges, the same level of flexibility and creativity is needed software.

Relative to other archival open source projects, software that focuses on transferring content from tape to file has been sorely in need of open and participatory development specifically for preservation challenges. The development of such software is partly challenged by its reliance on hardware; video connections such as SDI, Component, Composite, or S-Video are not natively supported by common operating systems but require hardware and software working in conjunction to process incoming audiovisual signals to a resulting set of files. An open source digitization application may not be able to support all computer video hardware, but could start with support for what hardware is already supported by an open SDK or API.

Designing an Audiovisual Digitization Application

Digitization Decision-Making

In order to develop a potentially comprehensive open source approach for archival videotape digitization, there are several dialogues within the community to consider and respond to. Archival communities that focus on formats such as documents, still images, and audio have had longer experiences with digitization workflows, whereas the digitization of video (hampered by storage sizes, bandwidth, and expenses) has only recently become more approachable. While digitization practices for documents, still images, and audio include more community consensus regarding best practices and specifications, there is a much greater technical diversity regarding the workflows, specifications, and even objectives for digitizing archival video.

Audiovisual archives face a dilemma in which amassed collections of videotape require detailed processing and digitization through legacy hardware and (increasingly) legacy software in order to sustain collections. As archives commit to digitization and work to find support, funding, and momentum for these efforts a number of technical decisions and details must be established, including simple questions such as: What codec to use? What file format to use? What metadata? What specifications? And more complex questions: Should the technical discrepancies within a tape collection be replicated within the resulting files? Should audio channels be grouped into audio tracks fitting with the possible multiple audio presentations supported by the videotape? What metadata concerning the videotape, its content, or the digitization event should be stored in the resulting file?

The audiovisual archiving community has a rich and well-established professional body of skills and knowledge related to all aspects of analog video preservation, but a relatively new relationship with digital video. Within discussion, planning, and project management it is natural to

focus on the details that are well understood and can be clearly debated and justified; however, often the most significant or costly decisions in project planning are the ones that are the least technically understood.

Parkinson's Law of Triviality, commonly referred to as bikeshedding, refers to scenarios where relatively unimportant aspects of planning receive abundant levels of focus and debate while more crucial details are skimmed over. Bikeshedding may be used to focus on what knowledge is known instead of what knowledge is needed. As archivists have often relied on the utilization of software for digitization and preservation work that was originally designed for production use, decision-making and planning for digitization and preservation efforts is occasionally limited to the context of this production software (such as envisioning specifications for a digitization plan based on what options are shown in Final Cut Pro 7). As archivists face greater technological challenges in preserving videotape content, there is less time to employ either a 'wait and see' or bikeshedding approach. Research, development, and informed action are sorely needed to reduce the risk of challenges impacting videotape digitization. The development of open source software, guided by the collaboration and participation of archivists, can play a central role in overcoming such challenges.

Preservation Singularity and Diversity

Although audiovisual archives have a rich history of managing technically diverse collections of multiple video formats used under various standards and specifications, there is often a recommendation to determine a singular digital specification for all digitization exercises. The rationale here is that the skill, knowledge, and hardware demanded to manage analog collections could be vastly simplified and reduced by requiring the archive to only manage one technical specification.

In practice this approach can appear to work in highly homogeneous collections, but within more technically diverse collections it can lead to compromises. For instance, to digitize all videotape to only a stereo audio configuration could create an unintended presentation where the tape may have a separate recordings or various language on different channels that are not intended for a left / right stereo presentation. To force all digitization to use four channel audio would be wasteful for video tapes that only provide 2 channels and lossy to video tapes that use more than four. Digitizing collections of mixed standards, such as PAL and NTSC, to a singular standard creates loss as frames and pixels are dropped or duplicated, and resized. Ideally digitization planning — and digitization software — should consider the significant characteristics of the diverse audiovisual collection being digitized in order to adapt digitization methods to best accommodate and maintain the significant properties throughout the process.

In the same way an archive may strive to ensure that it maintains all video decks necessary for access to the videotape collection, the same must be true for the digital counterparts. U-matic and Betacam SP were once considered suitable long-term carriers for video but continuing to sustain video in these carriers today is increasingly a sustainability risk. Likewise, decision-making for digital carriers made today may be tomorrow's risk and require reformatting similar to current practices for migrating analog material.

Archives should work to ensure sustained control of their adopted digital formats in order to maintain the necessary software to properly decode, present, and transcode the material efficiently, file-by-file or in large-scale batches of files. In the analog equivalent, this control was sustained through maintaining video decks. The players for digital video files are predominantly software based and have the advantage of often being open source and easily recreated and reproduced.[28]

28 The author has written further on the advantages and challenges of digital video players in a research paper for the Tate Museum available at http://www.tate.org.uk/research/publications/sustaining-consistent-video-presentation.

Standardization and Significant Characteristics

To the greatest extent feasible the resulting digital file should mimic the significant characteristics of the analog source. Some significant characteristics are intrinsic to the analog format and some are interpreted and applied by an operator as the video is presented. Because of this, the selection of a target format is based partly on sustaining some characteristics (such as frame rate or field dominance) and clarifying other characteristics (such as aspect ratio and audio channel mapping).

Any effort to digitize videotape materials for the purposes of preservation should critically consider how the significant characteristics are sustained or compromised throughout the digitization process. In some instances an archivist may intentionally change one or more of these characteristics but should document these changes and take care not to do so unknowingly. Maintaining such characteristics ensures that the digital results are more authentic to the original and more effectively ensures that the resulting digital file is capable of reproducing the quality, content, and function of the original videotape.

Some characteristics of modern audiovisual file formats are ambiguous in the context of analog video tapes. Concepts such as display aspect ratio or audio channel configurations may have suggested defaults (such as presuming 4/3 for display aspect ratio or the first channel as left and second channel as right for audio), but often deviations from the norm were generated and possibly documented (perhaps on the tape's label). While the playback hardware could not read the tape's labeling, the operator could use this information to make adjustments.

The aspect ratio refers to the ratio of width to height of the presented frame size, commonly 4:3 or 16:9 though many others are feasible. Although a digitized frame may be sampled and encoded as 720 pixels wide and 576 pixels high, the aspect ratio could be 4:3, 16:9, or possibly another ratio. An analog tape may labeled as 16:9 or anamorphic and intended to be adjusted when played back from a video deck. In these cases the display aspect ratio can be adjusted so that instead of digitizing a tape to 720x576 at 4:3 display aspect ratio it can be digitized to 720x576 at 16:9 display aspect ratio. Often the individual video pixels of a video frame are not intended to represent squares but rectangles (the ratio of the width and height of the pixels' shape whether rectangular or square is known as the pixel aspect ratio). If a 720x576 video frame is intended to be presented at a 4:3 display aspect ratio than those video pixels are tall and thin rectangles. If a 720x576 frame is intended to be presented at a 16:9 display aspect ratio than the pixels are short and wide rectangles. If a 720x576 video frame is presented with square pixels than the display aspect ratio would be 5:4 which is uncommon. The videotape contains the information that comprises the value and amount of pixels but it is a controllable, technical metadata value in the resulting file that determines what aspect ratio is used to present those pixels.

A video tape may have labeling to say the tape is stereo, or the first channel is mono audio only, or first channel for English and second channel for French. While the label relays information to an operator, it does not relay that data to a video deck. Thus, to present the videotape correctly requires some manual audio channel configuration.

Video digitization software often provides a means to arrange and label audio into tracks and channels to ensure that the intended audio presentation is supported by file metadata.

Scenario #1

Here an analog video tape has 4 audio channels. The first two channels contain left and right presentations of a program and the third and fourth channels contain silence. The tables below outline two common tactics for digitizing this content. Option #1 maps each channel of the source tape to a channel of its own track and tags each track for mono presentation. During playback all four tracks present play simultaneously. This option does not clarify the audio channel arrangement within the resulting file.

Option #1

Analog Channel	Content	Digital Track	Digital Channel
Channel 1	Program Left	Track 1	Mono
Channel 2	Program Right	Track 2	Mono
Channel 3	Silence	Track 3	Mono
Channel 4	Silence	Track 4	Mono

In option #2 the first two channels are both mixed into a single two-channel stereo track so that the file on playback presents the tape's first channel for left presentation and second channel for right presentation and the other two channels of the video tape are not included in the digitization.

Option #2

Analog Channel	Content	Digital Track	Digital Channel
Channel 1	Program Left	Track 1	Left
Channel 2	Program Right	Track 1	Right
Channel 3	Silence	Unused	
Channel 4	Silence	Unused	

Scenario #2: Independent Content per Channel
In this scenario a video tape includes distinct content on each channel. The channels are not intended to be presented simultaneously but are intended to be selected according to the intended presentation. If all channels were recorded to the same track (which is the only option given in Media Express) the presentation would be a cacophony of audio that is not intended for simultaneous presentation. In this scenario the audio channel mapping could be more clearly expressed as in the table below.

Analog Channel	Content	Digital Track	Digital Channel
Channel 1	English	Track 1	Mono (eng)
Channel 2	French	Track 2	Mono (fre)
Channel 3	Spanish	Track 3	Mono (spa)
Channel 4	Unused	Unused	

Although many digital audiovisual formats support language tags and descriptions for audio tracks[29] (which would greatly aid and clarify audiovisual presentation); unfortunately, these

29 It is worth noting that software for DVD authoring often provides mechanisms to add language tags and descriptions to various audio tracks, but it is worthwhile to incorporate and clarify this information within the digitization and preservation process as well.

features are rarely integrated into existing videotape digitization software.[30] Additionally most videotape digitization software provides insufficient control over audio handling so that operators must map all of the videotape's audio channels to a single digital audio track. Final Cut Pro 7 provides some means to map audio channels into channel and track arrangements but also includes some burdensome limitations such as arbitrarily only handling a selection of 2 audio channels as an input from DV tape transmitted over FireWire when 4 audio channels may be present.

Digitization Software Requirements

Although the dream of a community-written, participatory, open source, audiovisual digitization software project is not yet fully realized, the building blocks for such an effort have been gradually falling into place. Many of those struggling with software in efforts to preserve videotapes know quite specifically the flaws of the process and what would relieve a significant amount of the burden and challenge of the process. An open source software effort could be as comprehensive as our preservation requirements are, including features such as:

- selection of audiovisual codecs to employ (with a focus on lossless and uncompressed)
- selection of audiovisual containers to employ
- audio channel mapping and configuration (to properly express audio arrangement)
- embedding of metadata or attachments that document the digitization process
- the ability to control key variable characteristics such as display aspect ratio
- strict adherence to the associated standards (such as expressing NTSC framerate as 30000/1001 rather than 29.97)
- incorporation with fixity, frame-checksum, and quality control features
- inclusion of scopes and analytics to supply real-time feedback on digitization quality

Open source, community-supported projects have been making inroads into other aspects of archival services. As the need for archives to support digitization efforts becomes more clear and essential, as other digitization software options become compromised, as the digitization preferences of the community become further standardized, and as the hardware manufacturers become more supportive of open source development, an open source approach to audiovisual digitization software is increasingly in demand for development, participation, and use.

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30 nudge, nudge
31 http://creativecommons.org/licenses/by/4.0/

CONTENT IDENTIFICATION FOR AUDIOVISUAL ARCHIVES

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1. Abstract

Digital archives exist within a complex global web of interests and agencies with ever-increasing — and often conflicting — demands placed on their limited resources. Issues with work identification confront them during acquisition, reconciliation, and de-duplication of assets obtained from multiple sources. Furthermore, they must accommodate manual workflows and the resulting process delays, volume constraints, and costs of error correction. A curated system of unique, global identification for audiovisual works, their derivative versions, and physical and digital manifestations as provided by the Entertainment Identifier Registry Association (EIDR) can directly address many of these issues and enable the provision of systems and services that address many more. We identify several use case examples, including a federated system for archive search and retrieval, the collection of off-air television broadcasts, and addressing intellectual property rights assertions.

2. Why Identify?

Archives do not exist in isolation; they are part of a wider ecosystem with each institution catering to a particular audience. The value of an audiovisual archive, however you choose to measure it, is always less than its value when part of a larger, interconnected network of archives.[32] Cooperation among archives helps fill the gaps in holdings and services that inevitably exist in any collection, while also providing opportunities for economies of scale, sharing costs, and collaboration on best practices. These advantages come at the cost of additional competition for an archive's already limited time and resources and sometimes may conflict with an individual archive's priorities, but the overall effect of collaboration is still significantly positive. A reliable method of shared identification minimizes costs and maximizes benefits: common assets are identified accurately; archives can easily exchange assets and metadata; federated search and cross-archive discovery become simpler; and digital delivery of assets becomes more streamlined. A system of globally unique, curated identifiers can also benefit an archive's internal operations, particularly during content acquisition, reconciliation of materials obtained from multiple sources, and asset digitization. Shared, curated identification also helps eliminate manual touch points in most workflows, leading to increased process accuracy and throughput while simultaneously reducing costs and errors. Many of these benefits mirror the improvements a shared, curated identifier has already brought to the commercial audiovisual sector.[33],[34]

Once you can clearly articulate what exists in a collection, the next hurdle is making that information available to those who need it: if the people who need you cannot find you, then you may as well not exist. The Internet has made searching easier — both searching for archives and searching an archive for items in its collection — but this is still far from the ideal. Not all archives are online and not all collections are equally accessible, leading to a continued reliance on word-of-mouth and oral history to identify the holders of desired assets.[35] At the same

32 The collective value of a network of archives follows the pattern established by Metcalfe's Law, with the network's value increasing at a greater rate than the simple sum of its individual members. ("Metcalfe's Law," http://www.businessdictionary.com/definition/Metcalfe-s-Law.html. Bob Briscoe, Andrew Odlyzko, and Benjamin Tilly, "Metcalfe's Law is Wrong," http://spectrum.ieee.org/computing/networks/metcalfes-law-is-wrong.).

33 Raymond Drewry and Don Dulchinos, "Transforming Entertainment Through Technology," *M&E Journal* (Winter 2013-14): 81-86.

34 "Streamlined Content Metadata Integration and Management Using Entertainment ID Registry (EIDR)," http://www.eidr.org/documents/Expo2012_Technical-PaperEIDR.pdf.

35 As evidenced by the regular research assistance requests on AMIA-L, the Association of Moving Image Archivists Listserv: http://www.amianet.org/participate/listserv.php.

time, digital media can allow simultaneous, geographically distributed access without degrading physical archival assets, but only for those archives that can afford to digitize their analog collections and also have the means to deliver them to their clients.

This is just a modern example of the problem of naming things. If there is no name for something, you cannot talk about it. If you are working with someone else, the two parties must have either a shared name or a way of translating each other's names. If neither of those is present, no exchange of information is possible. In that worst case, "Wovon man nicht sprechen kann, darüber muss man schweigen. (Whereof one cannot speak, thereof one must be silent.)"[36]

3. How to Identify

A collection is only as good as its identification system: if you cannot find something, then you may as well not have it. Humans and machines search differently. People are very good at using imprecise search terms and finding the results that matter to them. Machines are more effective with precise searches. For example, principles for constructing preferred titles for motion pictures in libraries have largely been unapplied. In libraries, cataloging practice is predicated upon a reliance on transcription from a chief source of information, typically from information as it appears on the publication in hand. In moving image archives, description is reliant upon a preference for the work's origin and historical context. In other words, general library catalogs are built to support the discovery of specific publications and their various editions, whereas a catalog in a moving image archive is designed to differentiate among works and variants of works. This difference in interpretation is a significant reason why the principles for constructing preferred titles is inconsistent at best, as can be illustrated by the various versions of the motion picture Blade Runner (1982):[37]

- Blade runner (Computer file)
- Blade runner (Motion picture)
- Blade runner (Motion picture : Director's cut)
- Blade runner (Motion picture : Final cut)

The main purpose for the addition of the qualifier "(Motion picture)" is to both collocate and differentiate among the various motion picture versions of *Blade Runner*, as well as to differentiate the motion picture from other forms of the work, in this instance the 1997 video game qualified as a computer file. This reliance on human-readable text strings is highly subjective and cannot be easily understood without a human being referencing the entire catalog record.

The preferred title text strings also do not correlate to how moving image works are commonly referenced in other contexts, particularly foreign language versions registered by local archives in other countries, such as Venezuela (El cazador implacable) or Russia (Бегущий по лезвию).[38] Since libraries are not oriented towards researching the distribution history of a motion picture, the foreign language release title would be transcribed in a separate catalog record for the videorecording of the film, with the foreign language appended to the preferred title: Blade runner (Motion picture). Russian. This approach is useful for human-readable browse displays, but is not suitable for machine matching, as it requires that all databases conform to the same principles consistently.

36 Ludwig Wittgenstein, *Tractatus Logico-Philosophicus* (New York: Harcourt, Brace & Company, Inc., 1922), Proposition 7.

37 The preferred titles for *Blade Runner* can be located as part of the Library of Congress linked data service, available at http://id.loc.gov, or at Library of Congress Authorities, available at http://authorities.loc.gov. Instructions for the formulation of preferred titles are included as a Library of Congress-Program for Cooperative Cataloging Policy Statement as part of the toolkit for *Resource Description and Access* (RDA LC-PCC PS 6.27.1.9 Appendix 1), available at: http://access.rdatoolkit.org.

38 "Blade Runner (1982) Release Info," http://www.imdb.com/title/tt0083658/releaseinfo?ref_=tt_dt_dt#akas.

Traditionally, when two parties have communicated about a work of common interest, they have identified the work by exchanging descriptive metadata along with any contract, query, asset, or transaction and then relied on manual labor to match everything together. Unfortunately, communicating parties do not always agree on what these descriptive data are or how they are structured — even titles may differ, especially when abbreviated to fit within arbitrary space limitations or when dealing with international releases of foreign works. Thus, record matching has been a long-standing challenge and remains an ongoing expense. This process can be improved significantly if the parties agree on a single identifier for each abstract work or individual asset. However, this is a point-to-point solution and the number of identifiers expands geometrically with the number of parties involved. Worse yet, since archive management and other workflow support systems are not particularly flexible, there is often no place to record these point-to-point identifiers in each party's support systems, so they reside off to the side, requiring manual effort to re-link them at every touch point.

We cannot solve all of these issues today, but we can begin with clear and unambiguous identification of audiovisual works, encompassing moving images and radio programs. There are several possible identification schemes, including:

- Content classification, such as used by the Library of Congress[39]
- Proprietary inventory indexing, such as used at the British Film Institute[40]
- Statistically-unique identifiers, such as UUIDs[41] and UMIDs[42]
- Globally-unique, curated identifiers, such as the Content IDs provided by the Entertainment Identifier Registry Association (EIDR)[43]

Each type of identifier has its advantages, but also its limitations. Classification systems are widely used, but can be cumbersome to assign and are open to subjective interpretation. Indexing systems are only valid within their local domains, limiting both their coverage and their utility. Locally generated identifiers are easy to produce and statistically unique,[44] but they cannot be used to link related assets and do not come with a discovery mechanism that can resolve an ID to its descriptive metadata. For workflows and applications such as described above, the best overall solution is the use of a curated identifier, such as the EIDR Content ID.

EIDR IDs are globally unique; externally resolvable; applicable to works in the abstract (title records), versions of works (edits), and representations of works (encodings or manifestations); and are able to support multiple types of asset groupings and relationships and to store multiple alternate titles and alternate identifiers per asset.[45] This last feature starts to alleviate the point-to-point translation problem: EIDR acts as a bridge between multiple systems.

39 "Library of Congress Classification," http://www.loc.gov/catdir/cpso/lcc.html.
40 "Advanced search," http://collections-search.bfi.org.uk/web/search/advanced.
41 "Information technology — Procedures for the operation of object identifier registration authorities: Generation of universally unique identifiers and their use in object identifiers," http://www.itu.int/rec/T-REC-X.667-201210-I/en.
42 Nadja Wallaskovits and Christian Liebl, "UMID — Unique Material Identifier," http://www.digitalpreservationeurope.eu/publications/briefs/UMID_Unique%20Material%20Identifier.pdf
43 "About EIDR," http://eidr.org/about-us.
44 It is not possible to say for certain that they will always be unique, but it is very unlikely that they will duplicate. (P. Leach, M. Mealling, and R. Salz, "A Universally Unique IDentifier (UUID) URN Namespace," http://www.ietf.org/rfc/rfc4122.txt.)
45 "Overview," http://eidr.org/documents/2014-07-01-EIDR_Overview.pdf.

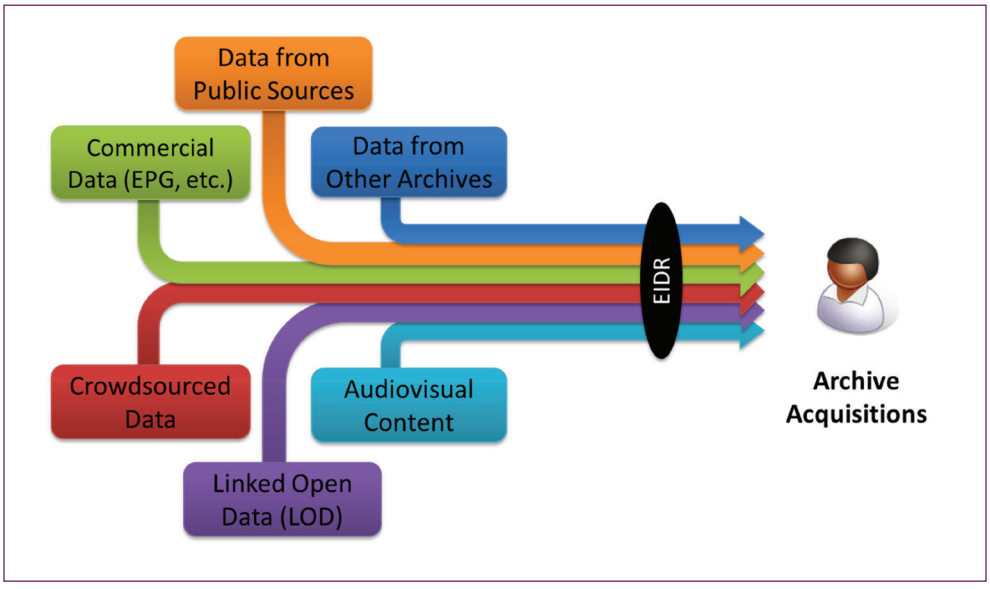

Figure 4. Bringing disparate elements together for an archive using a shared EIDR ID.

The ID itself is an ISO-standard DOI (Digital Object Identifier),[46] which, despite its name, can be applied to physical or digital assets.[47]

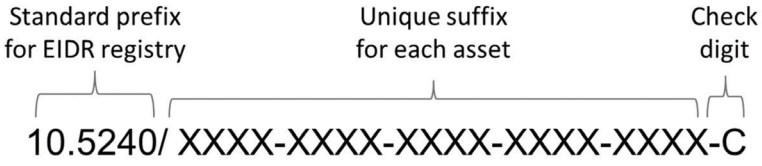

Figure 1. The structure of an EIDR Content ID.

EIDR IDs are opaque, "dumb" numbers randomly assigned from a pool of 1.2 septillion possible values.[48] They cannot be parsed to provide descriptive information as with a classification scheme. Instead, they are publicly resolvable, so if you have an EIDR ID, you can look up its descriptive metadata without restriction or charge. You can also do the reverse, where you use the descriptive metadata to look up the ID. Alternatively, if you have one of the many alternate IDs recorded in EIDR records, such as an ID provided by a data aggregator, another archive, or a production company, you can use that ID to retrieve the associated EIDR ID or pivot on the EIDR ID and retrieve one of the other alternate identifiers, depending on your particular need.[49] EIDR IDs are also durable: once issued, they are never deleted, so they can always be resolved to the associated content record.[50]

46 "Key Facts on Digital Object Identifier System ," http://www.doi.org/factsheets/DOIKeyFacts.html.
47 A Digital Object Identifier is a digital identifier of objects, not an identifier of digital objects. This is akin to the confusion surrounding the one-eyed, one-horned, flying, purple people eater, which is, in fact, an eater of purple people not, as so many incorrectly assume, a purple eater of people. (Sheb Wooley, "The Purple People Eater" (New York: MGM, 1958).)
48 16^{20} = 1,208,925,819,614,630,000,000,000.
49 "EIDR System version 2.0 Registry User's Guide," http://eidr.org/documents/EIDR_2.0_Registry_User_Guide.pdf.
50 If an EIDR Content record is deleted, the EIDR ID is aliased so that it resolves to the EIDR Tombstone record. The International DOI Foundation guarantees the persistence and resolvability of all issued DOIs.

The hierarchical EIDR record examples are based on a theatrical motion picture and a television series, but the same hierarchical registration structure can be applied to audio-only works, such as radio programs,[51] making EIDR Content IDs equally applicable to the management of both moving images and radio programs.

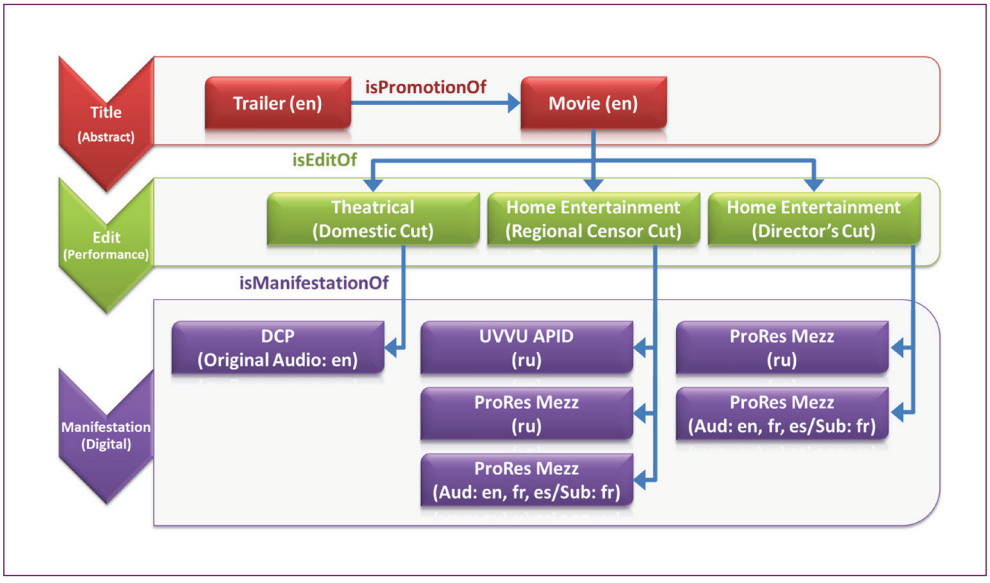

Figure 2: Sample EIDR registration tree for stand-alone works.[52]

51 Music recordings are best identified with an ISRC (International Standard Recording Code, www.usisrc.org). Music videos can be identified with either or both an ISRC or EIDR ID.

52 Commercials and other advertising ephemera are best identified with an Ad-ID (www.ad-id.org). Trailers (as shown in the diagram) and other items that promote audiovisual works can be identified with either or both an Ad-ID or EIDR ID.

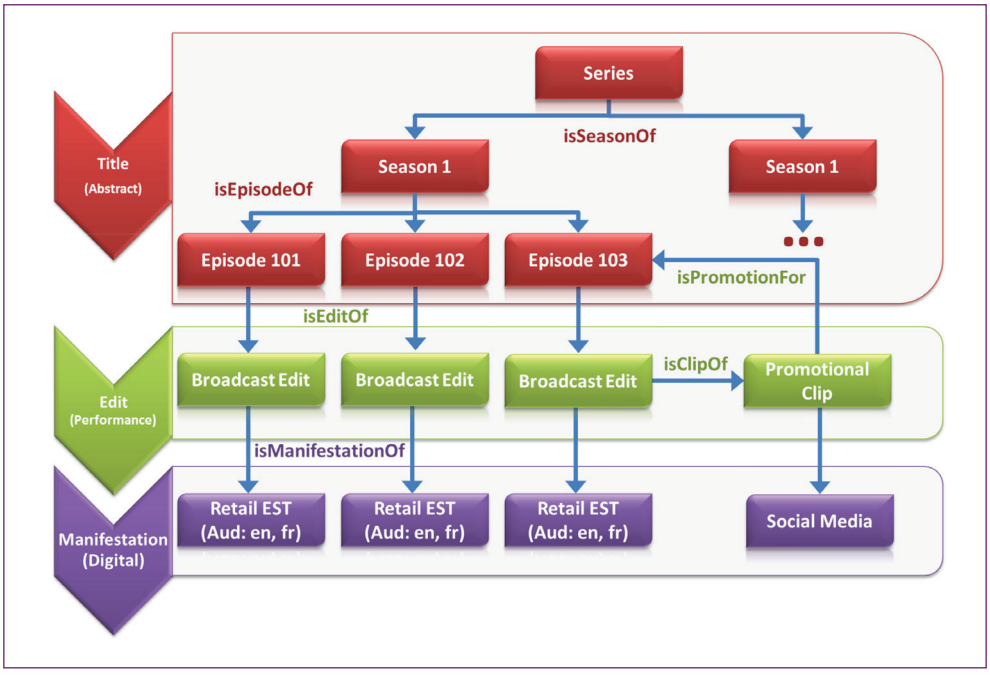

Figure 3. Sample EIDR registration tree for episodic works.

In addition to the hierarchical structure associated with most Content ID records, EIDR also supports a number of different non-hierarchical relationships, such as the isPromotionOf relationship that can link a trailer to the work it promotes. EIDR also supports different grouping relationships, such as isCompilationOf that can be used to identify collections of works ranging from the oeuvre of an auteur director to the contents of a Blu-ray disc. If a particular item or relationship is not already in the EIDR Registry, any EIDR member[53] can create it.[54]

The EIDR Registry strictly controls modification access to existing records, but freely allows Members to create new root records or children of existing records. That way, if an archive ever needs an EIDR ID for a particular application, it is always readily available. Furthermore, this model allows trusted sources, such as producers, metadata providers, and archives to improve the EIDR metadata — adding a missing director, adding a new alternate ID, correcting a foreign-language title, refining a release date, and so on. This can be thought of as a controlled version of crowdsourcing, combining the benefits of group input with a healthy dose of quality control.

The EIDR Registry contains metadata and APIs that allow traversal of the hierarchy and discovery of related items through relationships. This model works well with both traditional applications and the evolving world of linked open data (LOD) and the Semantic Web.[55]

Archives will continue to use their own identification system for strictly internal operations, but can gain significant advantage by using EIDR IDs for their interactions with the outside world, and with each other.

53 EIDR Members span the media and entertainment ecosystem including producers, distributors, broadcasters, archives, and data aggregators in the Americas, Europe, and Asia. ("Members," http://eidr.org/membership/)
54 EIDR, "Registry User's Guide."
55 "Semantic Web," http://www.w3.org/standards/semanticweb.

4. EIDR-Enabled Applications for Archives

To appreciate how the broad adoption of EIDR Content IDs can benefit archives, we present a number of scenarios that illustrate how EIDR IDs can be used to enable or improve workflows.

4.1 Federated Search and Discovery

A unified mechanism for search and discovery across archives allows individual archives to act as nodes in a larger archive network, providing transparent client access to the aggregate catalog.

If archives were to integrate curated content IDs into their technical infrastructure, they could more easily provide their clients with the ability to discover, curate, transfer, loan, and provide access to digital content. Such a system could also be extended to search and discovery for physical assets, though transfers and loans would still be more difficult to implement.

Since internal identifiers are rarely shared among archives, a common identification practice in current use within library catalogs is the concept of preferred titles or uniform titles to identify works and their various versions and manifestations. This facilitates manual catalog matching, but is not particularly useful in automation.

Returning to Blade Runner,[56] using EIDR Content IDs instead of title strings, the various incarnations of the film are unambiguously identified as:[57]

- Root Record
  - 10.5240/EA73-79D7-1B2B-B378-3A73-M — the abstract title (for a general search)[58]
- Child Edit Records
  - 10.5240/6E98-7A29-CD01-DFA3-4218-H — the original 1982 theatrical release
  - 10.5240/7290-C8AD-12BA-4F93-3B07-7 — the 1992 director's cut
  - 10.5240/E591-87E8-122F-F5F5-FEF8-3 — the 2007 "final" cut

It would then be a trivial matter to check which archives held copies of the various versions of *Blade Runner* by querying against the desired EIDR ID. EIDR manifestation IDs (child records of a particular edit) could then be used to distinguish a 35mm film print from standard definition video and high definition video, allowing researchers to query and compare not only the versions of titles held at different archives, but also to identify which archive has the work in the optimal format for each particular use.

An archive wishing to find more information about a work, for example for a special screening or to further its own research goals, is able to use EIDR alternate IDs to communicate with the issuing archive (or other sources) even if those sources do not expose EIDR in their public search systems. That way, merely registering a work with EIDR and providing a local identifier increases the possibilities for collaboration even if a fully federated search is not possible.

4.2 Acquisition of Off-Air Recordings

Most national, local, and commercial television and radio archives record off-air television and radio recordings and add them to their holdings as digital assets. This represents a high volume of content, both in terms of total hours of programming and in individual catalog items, so

56 As the Director did so often.
57 EIDR Content IDs also can be assigned to non-linear works, such as video games, if required.
58 All EIDR Content IDs can be resolved on-line via the EIDR registry and the DOI proxy. In this case, the links would be https://ui.eidr.org/view/content?id=10.5240/EA73-79D7-1B2B-B378-3A73-M and http://doi.org/10.5240/EA73-79D7-1B2B-B378-3A73-M, respectively.

every economy of scale must be applied to make this acquisition activity practical. Archives can collect these materials in digital form using automatable, scalable, and mature off-air capture platforms, such as Cambridge Imaging Systems' Orbital,[59] but the captured descriptive metadata tends to be both low density and low quality. This then requires a separate acquisition step to obtain complete descriptive metadata and a matching process to link this to the recordings. There may actually be multiple matching exercises per program if the metadata are obtained from multiple sources.

Using EIDR Content IDs for program identification, and then embedding those IDs in the broadcast stream, EPG data, certified broadcast logs, and descriptive metadata available from the broadcasters themselves and third party data aggregators, would allow the archives to collate these disparate sources in an automated workflow to produce a rich content record for down-stream catalog activities, including client search and discovery. This would also allow sharing among archives, so if one possesses an improved metadata set, others can take advantage of it without having to absorb the full cost and time delay to collect and curate the data on their own.

This process would also add value to the recordings themselves, making them more available to the original broadcaster or other licensees for reuse and resale across the broadcast sector. Archives could also make use of EIDR IDs to describe and identify any derivative versions of the broadcast programs they may produce in-house, such as an edit where they have pulled the blacks (removed the commercial breaks) or a package of contiguous clips where they have divided a longer program into more easily digestible chunks. Finally, multilingual programs presented in multiple markets and identified by a suitable EIDR edit or manifestation ID could be automatically linked together via their common abstract title ID by traversing the EIDR hierarchy from the child ID to the parent ID.

4.3 Bulk Digitization

Many archives are moving to digital encodings of their holdings. This offers many advantages, including avoiding wear on physical assets and the ability to deliver content to more people in more places and more ways than ever possible with physical assets and analog media. Before these advantages can be realized, the assets must be digitized. This poses its own challenges when an archive is digitizing its own holdings, but there is an extra layer of manual effort and opportunity for error when third parties are involved.

For example, for the British Film Institute's Unlocking Film Heritage project, the BFI is digitizing 5,000 films from its own collection and acquiring digital versions for an additional 5,000 films from partner archives and commercial rights holders across the UK. For the acquired assets, the supplying partner must find the title in the BFI catalog, correctly associate it with the asset they are digitizing, and deliver the final digital copy along with any metadata enhancements to the BFI for ingest into the BFI's digital catalog. This involves multiple manual touch points, each of which adds to the partner's cost and increases the systemic chance for error. Taking an actual case, there are six moving image adaptations of the play *Hindle Wakes* in the BFI catalog, each with essentially the same description, since they are all based on the same underlying material. During the selection workflow, one of the versions was matched to the wrong BFI catalog entry for both the digital asset and the incoming descriptive metadata, requiring significant time to correct the error. Because of the potential for this sort of mismatch, the BFI must perform manual quality checks on each incoming asset to make sure it has been identified and ingested correctly, increasing the BFI's internal costs for every asset acquired in addition to the cost of correcting any errors that are uncovered.

59 "Orbital Enterprise Video Recording," http://www.cambridgeimaging.com/orbital_enterprise_video_recording.

If the programs and their associated metadata were identified with EIDR IDs, most of the manual touch-points could be removed from this process, making it faster, more accurate, and less costly for all parties involved.

In addition, there are cases where the BFI does not have a record for the incoming work. The current process calls for the supplying partner to provide descriptive metadata using a template. The BFI then manually extracts the necessary descriptive metadata to create their catalog record. If the work came in with an EIDR ID, the BFI could take advantage of the alternate IDs associated with many of the EIDR records to automate the acquisition of descriptive metadata from third parties such as IMDb but also including Netflix, Flixster/Rotten Tomatoes, and Internet Video Archive. Internal IDs unique to a work's producer or distributors stored as EIDR alternate identifiers, such as those from 20th Century Fox, ITV, Sony Pictures, or Warner Bros., can be used to obtain descriptive metadata directly from the work's creator.

4.4 Intellectual Property Rights

The EIDR Registry does not store intellectual property rights information or make any assertions regarding rights or ownership. Its sole focus is accurate identification, with support for discovery and de-duplication as necessary companions to achieve that aim. Any system in which rights holders can assert their rights in different works and then provide a mechanism where those rights assertions can be aligned with materials held by archives must first begin with reliable identification, de-duplication, and discovery. Rights certainly depend on factors external to the work itself, e.g., media or distribution channel, territory, and dates, but also on the particular version of a work, covering different music, voice talent for dubbing, edits that add or remove footage controlled by third parties, and so on. The EIDR hierarchy covers all of these internal aspects, allowing the external legal and commercial rights to be connected to exactly the right version of the work.

The Copyright Hub is a UK-based initiative to create the technological infrastructure to support just such a rights tracking system.[60] Identification via curated EIDR IDs is critical to the pilots currently under development, since this will allow the creation of the machine workflows necessary for the process to scale. The assurances of EIDR-based identification build confidence in the process and facilitate negotiation of the delicate rights relationships between archives and their donors. The archives do not want to risk jeopardizing their donor relationships with rights holders by exploiting their content inappropriately. At the same time, archives want to be able to explore innovative content exploitation initiatives without having to allocate manual labor necessary to identify and enforce these rights for every asset held by the archive.

Similar problems exist with orphan works and the diligent search initiatives that are being developed to allow interested parties to legally and safely exploit them, including OHIM and FORWARD in Europe[61],[62] and OWLS in the UK.[63] Such schemes encourage the use of permanent, external, unique identifiers, such as EIDR IDs. The effort necessary on the part of an archive to achieve diligent search certification can be amortized across multiple services if the archive submissions and the corresponding entries in the orphan works databases are identified by an EIDR Content ID. In addition, the alternate IDs in EIDR can provide other sources to search.

Finally, the machine automation facilitated by EIDR IDs would also make it easier for the orphan work services to correlate their data with third parties, such as retransmission rights collectives, to better identify the owners of assumed orphan works (and to more certainly assert that particular works are, in fact, orphans).

60 "Welcome to the Copyright Hub," http://www.copyrighthub.co.uk.
61 "Orphan Works Database," https://oami.europa.eu/ohimportal/en/web/observatory/orphan-works-database.
62 "Framework for a EU-wide Audiovisual Orphan Works Registry," http://project-forward.eu.
63 "Copyright: UK orphan works licensing scheme," https://www.gov.uk/government/consultations/copyright-uk-orphan-works-licensing-scheme.

5. Summary

A few moments spent with a blank whiteboard will lead to the identification of many more use cases where a curated identifier (globally unique, permanent, and universally accessible) can help reduce costs, increase accuracy, facilitate new services, and make an archive's collections even more accessible and valuable to their service communities. The value of curated identification grows significantly with each additional party participating in the ID ecosystem, with each additional database and workflow that carries the IDs, and with each additional asset so identified. Individual archives can also take advantage of the network effect originally described by Metcalfe's Law, where the value of a network, and therefore the value apportioned to each participant, is far greater than the sum of its individual parts. To achieve these goals, a curated identification system must have a global reach and accurately and unambiguously identify the various types of works held by audiovisual archives, from the abstract title level through their derived edits down to their specific representations with clips, composites, and compilations alongside. The Entertainment Identifier Registry Association provides just such an identifier in the form of its EIDR Content ID, based on the ISO-standard DOI system.

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DIY DIGITAL RADIO PRESERVATION: AN INTRODUCTION TO CITR'S AUDIO ARCHIVING PROJECT

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1. Introduction

In 1937, the University of British Columbia's Alma Mater Society inaugurated Varsity Time, a weekly half-hour radio program on CJOR, meant to provide information about campus activities to residents of Vancouver and BC. From this program grew the Radio Society collective, which aimed to provide a training ground for journalists and broadcasted a weekly news program "UBC Digest" across the country in the 1950s. The society became known as CYVR — UBC Radio in 1969, when it began broadcasting from the Student Union Building. In the mid-seventies the station was reopened after a Canadian Radio-television and Telecommunications Commission (CRTC) shutdown as CiTR, which continues to broadcast today in FM at 101.9.

CiTR's collection of over six hundred reel-to-reel audio tapes is unique and diverse, consisting of radio programming including but not limited to: live performances, interviews, sports and news reports, radio plays, lectures, regular radio shows, public service announcements, and station advertisements. They have many recordings of musical performances by local bands going back to the early 1980s that have significant cultural value and are not found anywhere else. CiTR has never been overly concerned with sound quality, and has operated on a shoestring budget doing as much as they can with limited resources. Approximately three hundred of their tapes are housed at the University Archives at UBC, and another three hundred are in the offices of CiTR, in the Student Union Building, awaiting transfer to those archives. CiTR has a volunteer with recording engineering experience digitizing reels to preserve and provide access to their collection of audio material. At the same time, they are making current, born-digital programming available as mp3s for streaming or podcast from their website. This paper will review current issues and best practices in digital audio preservation, introduce the station's current production of both digitized and born-digital audio content, and provide recommendations to CiTR for incorporating best practices into their existing workflow to optimize the long-term digital preservation of the records of their programming activity.

The station is primarily run by volunteers and has limited resources, financial or staff, to contribute to a digital preservation program. Therefore the perspective and analysis in this paper will be tailored to a small, bare-bones, do-it-yourself organization, keeping in mind the limitations of CiTR's working environment and attempting to present ideas that can conceivably be incorporated into the existing climate of the non-profit organization. My approach is informed by case study research conducted in InterPARES 2, which, in reference to digital preservation in the arts, found that "standardized preservation criteria and procedures may not be effective or appropriate and that preservation decisions may, in many instances, need to be addressed on a case-by-case basis."[64] I use the definition of digital preservation from Luciana Duranti, i.e., the specific process of maintaining digital materials during and across different generations of technology over time, irrespective where they reside.[65]

2. Issues in Digital Audio Preservation

Samuel Brylawski reminds us "Sound has been recorded digitally since the 1970s, when pulse code modulation (PCM) became an accepted method of recording by audio engineers and producers."[66] Digital audio files are created and distributed in a myriad of ways, existing in disparate formats, qualities, on CDs, DATs, as files on phones, portable music players, or computers. In fact, Brent Lee writes that the single thing held in common by digital audio files is that "they all contain a stream of numbers that represent changes in the amplitude of sound pres-

64 Hackett et al., 23.
65 Duranti, "The Preservation of Digital Records".
66 Brylawski, 53.

sure over time."[67] File-based born-digital recording is the dominant method of contemporary audio production, while the fragility and threat of obsolescence of machine-dependent historic audio formats, as well as the chemical instability of materials composing CDs and DVDs, has made digital reformatting of audio records a standard tool of preservation and conservation.[68]

However, audio digitization and preservation projects are challenging for organizations of any size to undertake. They require new knowledge and training, ongoing funding, dedicated staff, extensive IT support, project management planning and workflows, quality control, attention to standards, appraisal, and arrangement and description, as well as ongoing accessible long-term storage. This list of requirements is not exhaustive. There are best practices and guidelines for workflow, such as those developed at Indiana University's Sound Directions and IASA, and conceptual models for digital preservation like OAIS and InterPARES' Chain of Preservation (COP), but typically these presume an existing record-keeping system is in place, and are prepared with resources from larger library and archival institutions in mind. They would not easily be implemented by a volunteer-based radio station like CiTR. Even within organizations with dedicated programs, budgets, and staff in place, the lack of knowledge about the recording and manipulation of digital audio files, the ear training and technical experience necessary to discern audio quality and faithfulness to originals, the threat of proprietary file formats not being readable in the future, the lack of standards, accuracy, and completeness for files' metadata, inadequate appraisal and description, appropriate and affordable storage repositories, and the sheer expense of the undertaking make long term preservation a daunting prospect for any organization with significant audio holdings.

Technological and organizational issues aside, there are also issues associated with the content. CiTR's volunteers are tracking information, when it is available, from reel hubs and their boxes: tape speed, brand, date, recording length, notes on reel condition, accession number, content type, and any extra program and music details, in a spreadsheet. Unfortunately, record-keeping was not a priority for many of the radio hosts in the early years of the station's existence, and re-using tapes multiple times was common practice in radio. Often there is either no information at all associated with the tapes, or labels have overlapping information if the tape was recorded over. There is always a possibility that tapes could have been separated from their original box. Because of this administrative context, listening to the tapes is the only reliable way to assess their content (as well as whether or not they have Sticky Shed Syndrome). This is another significant, time-consuming challenge to the prospect of a digital reformatting project.

Copyright and intellectual property also present risks specific to radio archives. Musical performances are covered by a multitude of copyrights: mechanical rights, public performance rights, announcer rights, recording rights, lyrics/music rights. Public performance rights pertain to any on-air 'performance' including poetry readings, interviews, and lectures, among others. CiTR does not now, nor did it in the past, secure clearance agreements or authorizations from any of its content producers. Currently they pay SOCAN for broadcast performance and live stream rights, and CMRRA for mechanical royalties, which include keeping a single digital copy of albums for their digital library. Backup copies of digital libraries are not technically covered by this agreement. No agreements exist for podcasts at the moment, which many broadcasters make available for spoken word programming, but not music, because of legal liability.

According to CLIR's 2002 report, Building a National Strategy for Digital Preservation, "The laws and licenses that govern streaming were designed with the assumption that its use is ephemeral. It is unknown whether recording streamed audio for archival purposes is legal."[69] In a 2010 report, The State of Recorded Sound Preservation in the United States, CLIR warns "liability for copyright and common-law infringements may occur regardless of whether money

67 Lee, 195.
68 Library of Congress National Recording Preservation Plan, iv.
69 CLIR, 58.

is exchanged for sound recordings."[70] The Canadian copyright act specifies a term of fifty years from date of death of the copyright holder of a work, but provisions in the recently revised act allow libraries and others to make copies for backup, and in different formats. Is CiTR's desire to make historic recordings of their programming available to their listeners over the long term a possibility, given the legal climate and difficulty of identifying and tracing copyright holders to obtain permission? What about making their content available in jurisdictions outside of Canada, as web distribution allows? Will this project be for the purposes of preservation only? Will CiTR be able to secure funding for a full digitization project if long-term access is a question mark?

One thing is certain, the principle of benign neglect has worked in the past for paper materials, but digital records, if ignored, can rapidly become inaccessible. "Doing nothing reduces to zero, in a very short time, the possibility of preserving digital materials. One familiar example is failure to monitor and respond to the deterioration of digital media ... and the consequent inaccessibility of any data it might carry."[71] InterPARES research, which applies archival science and diplomatics to digital preservation, concludes that it is "literally not possible to preserve an electronic record like a record on paper." Therefore, digital preservation consists of preserving the ability to reproduce an electronic record in its proper form, with its essential digital components, rather than preserving the record itself.[72] We have to separate the technology from the digital records in order to render them using hardware/software combinations that are different from how those records were initially created.[73]

3. Current Technical Practice for Digital Sound File Production at CiTR

CiTR is digitizing a small amount of their reel-to-reel audio tapes using one of the station's Revox PR99-MkIII machines, as a test case to determine the feasibility of digitizing their remaining tapes in house or outsourcing them to an external vendor. They use a half-track quarter-inch deck built in July 1990, which runs at the standard 7.5 and 15 inches per second speeds, and also continuously variable between approximately 5.1 and 22.5 inches per second. The volunteer doing the digitization work realigned it to Magnetic Reference Laboratories Test Tape 21J205, such that it is calibrated to +6 dB as per Studer/Revox specifications. Tape speed has been checked against a homemade test tape (segments of exactly 225 inches plus or minus 0.02 inches separated by leader) and found to be accurate within 0.04 percent. The tape deck is connected via XLR cables to a Focusrite Scarlett 2i2 AD/DA convertor at 96 kHz/ 24 bit stereo, running into REAPER (proprietary digital audio workstation software) on a dual-core Intel Xeon 2.0 Ghz. The raw files are WAVs; these undergo FFT and spectrograph analysis, applying noise-reduction and speed, EQ, and phase correction, and the resulting files as lossless FLAC — 96KHz / 24-bit for music, 44kHz / 16-bit for speech.

For their born-digital content, currently CiTR uses the SAM Broadcaster application to stream their programs and produce reports for the CRTC. They use a custom build of Burli podcaster software to create mp3 podcasts that are stored on a server in their office and backed up on a second server. Those podcasts, consisting of xml files with each program episode appearing as an item with a link to its associated mp3 file, are on their website, http://www.citr.ca/index.php/schedule/shows/. Podcasts contain metadata of the show title, date, host, description, genre, and website or twitter feed. CiTR is also building an mp3 library of albums ripped in iTunes and tagged with mp3 tagger using the ID3 v2.4 de facto wrapper standard, and currently have over 54,000 files taking up 294 gigabytes of space on another server. CiTR chose the mp3 format over a higher quality, lossless file format because of space considerations. However, they do have some albums in the lossless m4a format that they are not using for broadcast. Metadata captured by CiTR for their digital library includes

70 Ibid., 115.
71 Harvey, 124.
72 Duranti and Thibodeau, 20-21.
73 Harvey, 78.

basic information automatically generated by iTunes, with Cancon and femcon fields manually added. For more rare recordings not recognized by iTunes, all fields are manually added by the dj using mp3 tagger.

4. Recommendations

While CiTR is not an archival institution, I believe it can employ some archival concepts and theory to positive effect with regards to the production of their digital audio file production. Considerations of accuracy, authenticity, authentication, and reliability are key concepts in digital preservation, and are defined in InterPARES' Creator Guidelines. For records to be authentic, identification of their means of production, manipulation, preservation, allowed access, identity, and integrity needs to be explicitly documented in a standardized and interoperable way. "Authenticity is, in fact, the result of a process, it cannot be evaluated by means of a boolean flag, and it is never limited to the document itself but extended to the information/document/record system."[74] This has an implication on file format selection, metadata schemas, and processing and storage decisions, among others.

Therefore, digital preservation ideally starts at the time of a record's creation. To create authentic copies of existing records, CiTR needs a project plan specifying policies and procedures, documenting the system environment as to exactly how the sound is captured, any changes made to files, file organization and metadata instructions, procedures to prevent, discover, and correct loss or corruption, and protection from media failure. This should be separate from a born-digital records plan. The recommendations mentioned below are introduced primarily with their large digitization project in mind, although preservation concepts apply to both. I hope they can be adopted and adapted with the same DIY spirit in which CiTR first approached radio programming. Given the fragility of magnetic media and the uniqueness of CiTR's collection, reformatting work will ideally be done only once with ongoing attention to preservation to ensure the work lasts for future generations.

Many audiovisual organizations, including IASA and Indiana University's Sound Directions, recommend the Broadcast Wave format as the recommended file format for long-term preservation. Broadcast Wave files are widely used, non-proprietary, platform-independent, and uncompressed. In essence, the difference between the Broadcast Wave over the regular Wave format is the ability to include metadata elements in the file's structure. CiTR can do this using BWF MetaEdit, an open-source tool produced by FADGI (http://sourceforge.net/projects/bwfmetaedit/). However, modifying a file by inserting additional metadata will adjust the checksum of the file, therefore a checksum hash value for the audio portion of the file only is recommended in addition to the hash value for the file as a whole for ensuring bit-level integrity of a file.[75] Checksums conducted on an ongoing basis using a command-line hash is standard procedure for ensuring the ongoing trustworthiness of a digital file as an aspect of its authenticity. Bressan and Canazza also recommend using JHove (Jstor Harvard Object Validation Environment), to automatically perform "format-specific identification, validation, and characterization of digital objects" (http://sourceforge.net/projects/jhove/).

While the provenance of their CiTR's audio records is not in question, researching the by whom, what, when, and how of poorly identified older programs is a daunting prospect. One whose importance must be underscored: "Recordings contain information on their artistic and cultural existence that goes beyond the audio signal itself. In this sense, a faithful and satisfying access to the audio document cannot be achieved without its associated contextual information, that is, to all the content-independent information represented by the container, the signs on the carrier, the accompanying material, and so on."[76] Once Digital Initiatives (UBC Library's digitization center) has finished digitizing *Discorder*, their in-house publication that

74 Bressan and Canazza, unpaginated.
75 FADGI, 25-26.
76 Bressan and Canazza, unpaginated.

has printed monthly programming schedules and articles since 1982, content research will be more feasible. Board member knowledge and the CiTR alumni Facebook group will be invaluable resources. CiTR's volunteers should be meticulous with the content-independent information, and it will be much easier to document information about the audio files being produced as they are made, rather than after the fact. CiTR has documented the system used for the test digitization work currently underway, and should endeavour to document its system as a whole, including custom alterations to software, as things change and work progresses. The InterPARES Guidelines for Creators will be a useful reference as work proceeds.

According to Harvey, the main types of metadata CiTR should consider including with their files are descriptive, structural, technical, administrative and preservation.[77] Duranti discusses integrity and identity metadata.[78] As a practical example for handling metadata, the archivist at the Western Front (a similar-sized non profit organization with comparable formats in their collection) is using a combination of PREMIS (which identifies preservation information) and Dublin Core to describe their audiovisual files. The main difference in metadata collected for the digitized versus the born-digital files is capture and processing information, which she obtains with the MediaInfo tool (http://mediaarea.net/en/MediaInfo). METS, or the Metadata Encoding and Transmission Standard, is another schema worth considering. FADGI is working on a metadata schema built expressly for audiovisual files, and that work should be monitored as it might become useful in the future, as might work being done on PBCore. Using standards for metadata like those described above improves the likelihood of interoperability with other schemas as they are developed, it aids future migration into new content management systems; metadata is, as Presto's *Techwatch* report clearly states, "absolutely crucial" for media asset management. A sample of recommended metadata elements for audio files from Bressan and Canazza is available here: http://www.hindawi.com/journals/jece/2013/489515/tab7/. Another example can be found in the user guide for the AVCC toolkit: http://www.avpreserve.com/wp-content/uploads/2013/10/AVCC_User_Guide_Beta.pdf. CiTR needs an appropriate, standardized metadata plan that works with their current CRTC-required data collection needs while also satisfying rights and preservation needs, keeping in mind that, "we must keep tweaking metadata systems through time — to calibrate them in accordance with our requirements and whatever happens to be the current technological environment."[79]

Audio files should be organized into logical groupings, with plans for file naming structures, categorization, classification, search and retrieval. AVPreserve released AVCC, a toolkit with guidelines, forms and a FileMaker database for cataloguing audio/visual material (which is only useful if CiTR already owns FileMaker Pro software). This is still in beta, but a useful example of how a large organization manages their audio content. One open-source option for a digital preservation content-management system is Archivematica. Though it is open source, it can require significant financial investment in set up fees for an individual organization's specific needs. As Archivematica works with its current clients, including MoMA and its audiovisual content, those custom builds will be released to the public, and may be worth keeping an eye on in the future. Once copyright details are sorted out, making content freely available on the Internet Archive is another possible solution that would cost nothing. Users are invited to freely submit audio content for streaming or download with a Creative Commons licence.

CiTR should keep multiple copies of their audio preservation files in different places, as well as access files that are used internally.[80] There is free, open-source backup and LTO management software from Bacula, used by Democracy Now, another non-profit media outlet. The Western Front uses LTO (Linear Tape Open) technology for their long-term storage, where they keep files and periodically check their integrity, and never overwrite them or re-save them. IASA and Presto Centre's *Techwatch Report* also recommends LTO for audiovisual

77 Harvey, 83.
78 Duranti, "Metadata and Archival Description".
79 Duranti, "Metadata and Archival Description.
80 IASA, 7.6.

material. However, this drive only has a fifteen to thirty year lifespan, so will need to be periodically revisited if selected as an appropriate storage medium, as technology changes. Cloud storage is another option that comes with its own pros and cons, one that AVPreserve has explored in detail for audiovisual materials. Once criteria is understood, e.g., the number of users needing to access storage, a budget and a plan for digitization, and we know approximately how many reels CiTR would like to preserve for the long term and their accompanying space requirements, storage discussions can take place in more detail.

CiTR should formalize agreements with its djs and guests in the future, with appropriate legal advice, to obtain clearances to make broadcasted material available in different formats in perpetuity. For digitized content, volunteers should track down copyright holders as much as possible in order to obtain permission before making any content publicly available. Rights information should also be documented in the metadata of the digital files. Ideally, ongoing funding and staffing (like a recurring iSchool work-study position) could support the long-term digital preservation goals of CiTR. Building a database to facilitate classification, search and retrieval of digital audio records, for example, would be an ideal future Professional Experience position.

Organizations such as CBC Vancouver, the City of Vancouver Archives, and the Western Front have all been very supportive of a DIY digital audio preservation endeavour like the one CiTR is undertaking, providing advice, recommendations, and even equipment. With that support, and CiTR taking what it can from professional best practices and current research in the field from projects such as InterPARES, the station is well positioned to trail-blaze new and affordable routes toward long-term digital preservation of its historic and contemporary audio programming.

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BITTORRENT SOFTWARE AND USAGE

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Mark Simon Haydn

1. Abstract:

While the circulation of cultural material outside of official channels is not new, the scale and infrastructure afforded by digital networks and peer-to-peer protocols has drastically changed its dynamics. Focusing on private trackers and online, members-only communities dedicated to sharing difficult to find and "gray-area" cinema content, our paper discusses new digital repositories and their connection to the traditional film archive. With discussion of the types of materials held, user participation, and custodial efforts to restore or improve cultural material, we will discuss the activities of a contemporary private tracker community. Additionally, the paper will interrogate the legality and copyright issues surrounding these activities and explore recent, licit adoption of the infrastructure that has been developed for online circulation. Discussion will conclude with attention to cases in which pirated material has resurfaced in a rights-holding context, and an assessment of what these developments mean for custodians of film material working in a traditional film archive context. As a combination of discussion, case study, and argument, the paper will serve as a topical primer on a pressing and under-researched area of interest in this field, building on a panel presented at last year's Association of Moving Image Archivists conference in Georgia.

2. BitTorrent Software and Usage

BitTorrent is a software protocol developed in 2001 and designed to aid the practice of peer-to-peer file sharing on the Internet. The primary advantage of BitTorrent is that it allows for segmented downloading, which is the coordinated transmission of a file sourced from multiple servers to a single destination.[81] This protocol allows for the rapid sharing of large amounts of data by allowing a user to download a file from multiple sources that are uploading the file at the same time.[82] This allows for more efficient and faster downloading than the traditional client-server model. The primary impact of this has been the rise of file sharing of all forms of media including ebooks, audio files, software, and video files. Another impact of BitTorrent is that it allows for the distribution of bandwidth among many users and can alleviate hosting and bandwidth costs for users interested in making large files available.

BitTorrent has proven to be a hugely popular protocol since its inception. According to the BitTorrent website, BitTorrent has over 170 million unique users each month.[83] A 2014 report conducted by Sandvine noted that 24.53% of all daily upstream traffic in North America is due to BitTorrent, with 5.96% of all daily Internet traffic being accounted for by the protocol.[84] In order to coordinate the servers that are uploading (seeding) and downloading (leeching) a file, a tracker is used. A tracker is a computer that coordinates the file distribution and often is represented on the Internet in the form of a web page with a user interface that allows for users to search the metadata about a torrent in order to find the file they are looking for.[85]

81 Wikipedia contributors, "Segmented file transfer," *Wikipedia, The Free Encyclopedia*, http://en.wikipedia.org/w/index.php?title=Segmented_file_transfer&oldid=629135424. http://en.wikipedia.org/w/index.php?title=Segmented_file_transfer&oldid=629135424.

82 "Segmented File Transfer."

83 BitTorrent, "About BitTorrent," http://www.bittorrent.com/company/about.

84 Sandvine Intelligent Broadband Networks, "Sandvine Global Internet Phenomena Report 1H 2014," Sandvine Intelligent Broadband Networks, 6. https://www.sandvine.com/downloads/general/global-internet-phenomena/2014/1h-2014-global-internet-phenomena-report.pdf.

85 Bradley Mitchell, "What is a Bit Torrent Tracker?," *About Technology* (2014), http://compnetworking.about.com/od/bittorrent/f/bttracker.htm.

3. Public vs. Private Trackers

There are numerous trackers on the Internet and they can be divided into two categories: public and private. Public trackers are readily available to users, do not require membership and usually are uncurated; in essence anyone can upload any file regardless of quality, copyright, or file format for users to download. Because these trackers are the most well- known and frequently used, they are often the source for much of the piracy that exists through BitTorrent. Their popularity also means that they are often the target of legal action and shut down due to copyright infringement. Frucci notes that trackers such as The Pirate Bay, Torrent Bay, Suprnova, and MiniNova have all been shut down due to legal actions.[86] Private trackers differ from public trackers in that they are typically accessible only to members of the tracker and often have a specific content focus. Frucci notes the existence of a wide variety of private trackers for "music, for movies, for HD Blu-ray movie rips, for both Mac and PC software, for porn, for comic books, for console games, for anime, for TV shows, for E-books, and for sporting events."[87] Private tracker communities typically contain highly devoted and active users, with strong subject knowledge and they are often highly curated with certain quality or content standards. For example, What.cd, a large music tracker, has certain quality standards for the audio files uploaded, and PassthePopcorn, a popular tracker devoted to cinema, has certain guidelines for what kinds of content can be uploaded.

There are no definite numbers on how many private trackers currently exist on the Internet. The blog Opentrackers.org provides a list of approximately 700 to 900 private trackers of varying sizes,; however, many of these trackers might not currently be active or have in fact been shut down. The reasons for shutdown typically involve the high costs of hosting and maintaining a tracker, which can range from monthly costs of $200 to $1200 or more depending on the size of the tracker.[88] Because most trackers do not charge for membership, they rely almost exclusively upon user donations to pay for monthly costs. In addition, the larger and more active a tracker is, the more time consuming it is to maintain. Many private trackers rely on volunteers to manage the day to day functioning of the site. It should also be noted that private trackers are not immune to legal action despite their relatively lower profile. In a noteworthy case, OiNK.cd, one of the leading private trackers dedicated to rare and hard to find music, was shut down in 2007 after investigation by the anti-piracy units of the International Federation of the Phonographic Industry and the British Phonography Industry.[89] Despite cases like this, the specialized focus and smaller scale of many private trackers along with their restricted membership has allowed these sites to remain somewhat under the radar of anti-piracy organizations.

4. Examining a Private Tracker Community

As part of our research, we focused on a particular private tracker community dedicated to arthouse and classic cinema, as well as music and books, of which both the authors are members. In order to protect the identity of the users and administrators of the site, we shall not provide the name of the tracker, which we will refer to as BC throughout this paper. BC is a leading private tracker started in 2005 that has grown to become a very popular and influential source for moving image content dating to cinema's infancy. Currently, the site has approximately 30,000 registered users and is host to nearly 150,000 torrents, of which about 60% are video files. In the nine years since its inception, the total traffic has totalled over 15,000 TB including both uploading and downloading.

86 Adam Frucci, "The Secret World of Private BitTorent Trackers," *Gizmodo* (February 19, 2010), http://gizmodo.com/5475006/the-secret-world-of-private-bittorrent-trackers.
87 Frucci, "Secret World."
88 Enigmax, December 14, 2009, "Private BitTorrent Trackers Commit Suicide With Rising Costs," *Torrent Freak*, https://torrentfreak.com/private-bittorrent-trackers-commit-suicide-with-rising-costs-091214/.
89 Ernesto, October 23, 2007, "Oink.cd Servers Raided, Admin Arrested," *Torrent Freak*, https://torrentfreak.com/oinkcd-servers-raided-admin-arrested//.

Perhaps the greatest appeal of the site and the community is the ability to access hard to find material. The site is home to a wide range of content including rare silent gems such as Ernst Lubitsch's seldom seen and generally unavailable 1924 silent film, *Forbidden Paradise*. The film has never been released on any home video format and the version uploaded here contains only Czech flash intertitles, but given Lubitsch's stature and the complete lack of availability of the film otherwise, access to a subpar copy is still of great value. The site is also home to foreign cinema including the rare educational films of Iranian director, Abbas Kiarostami and alternate versions of established classics, such as the five-hour version of Serbian filmmaker Emir Kusturica's 1995 film *Underground*, which only aired once on German television and was never intended for wide release. The quality of the content on the site is generally quite high, with users encouraged to upload the highest quality files, often ripped from commercial Blu-ray releases or from other HD sources. While numerous low quality rips, often sourced from bootlegs of unknown origin, find a home on the site, their presence is primarily due to the unavailability of higher quality versions.

5. Content Access and its Impact on Cinema Studies and Research

Private trackers like BC are providing access to previously unavailable films from around the world and from every era and movement in cinema's history. Iordanova argues that the "multitude of diaspora-driven Web vaults"[90] along with many other channels for streaming and downloading "are profoundly changing the landscape for the study of film."[91] Iordanova also suggests that the increasing availability of niche and "peripheral cinemas"[92] online takes knowledge of these texts out of the exclusive realm of subject experts and places it in the hands of anyone who has an online connection and a desire to watch the films. This allows for new avenues of research to be explored, both through making the cinema of virtually any movement, genre, director, or era available and allowing many different voices to participate in the discussion.

The utility of a private tracker like BC allows users to search for content by year, country of origin, genre, director or keyword. This allows unique and unexplored connections to be made by users, for example one can download an early MGM-talkie like 1930's *The Big House* and also download the foreign language versions (*Revolte dans la prison and Menschen hinter Gittern*) of the film that were produced at the same time. This could be useful to do a stylistic comparison of the three versions of the film, or alternately as research into the work of Hungarian auteur Pál Fejös, who directed the foreign language versions, or more generally as a jumping off point into research about foreign language versions of Hollywood films. The potential for new avenues of research grows every day as new content is made available.

6. Why Does This Community Work: Crowdsourcing and Curation

It is worth discussing how and why this content is made available on a private tracker like BC. Once a person joins the tracker, they are free to begin participating by downloading and uploading content. On public trackers, it is common for users to download a torrent and, once the file is downloaded, to close the torrent and no longer upload the completed file to save their own bandwidth. In the public context, there is no incentive to upload content and no penalty for not seeding a file. In a private tracker community, this is not a viable strategy and in order to encourage users to upload new content and seed existing content, the concept of share ratio is used. A share ratio is determined by dividing the amount of data a user has uploaded by the amount a user has downloaded. Many private trackers set a minimum share ratio that users must maintain to keep their accounts in good standing. The ratio has the dual effect of incentivizing the uploading and seeding of content. For example, a user might upload a DVD-R file that is four gigabytes or more, or be inclined to download and seed a larger file that

90 Dina Iordanova, "Instant, Abundant, and Ubiquitous: Cinema Moves Online," *Cineaste*, 39:1 (Winter 2013): 46.
91 Iordanova, "Instant, Abundant, and Ubiquitous," 46.
92 Iordanova, "Instant, Abundant, and Ubiquitous," 46.

has just been uploaded by someone else in order to improve their ratio. This is in essence the currency of BC and private trackers, as the more content a user uploads and seeds, the more a user can then download. This has proven an effective tool for BC to stimulate the growth in content and to ensure that older content remains available through users seeding the files.

This idea of a collection sourced entirely by users fits neatly within the online model of crowdsourcing, which has been defined as the "the practice of obtaining needed services, ideas, or content by soliciting contributions from a large group of people and especially from the online community."[93] A collection like that on BC could only be facilitated through crowdsourcing, as the breadth of the collection and sheer volume of data would be impossible for a single individual or organization to manage. For example, the time needed to upload a torrent (which can include ripping the file from a DVD or other source, creating a torrent file, providing screengrabs from the rip, creating metadata about the rip, as well as providing information about the film) can take 15 minutes to several hours. In addition, by drawing upon users from around the world to provide content, the collection becomes diversified in a way that transcends national boundaries and gives representation to potentially marginalized films, genres, or movements.

This notion of crowdsourcing the collection extends even further to aspects of curation as well. Users provide descriptions of content that can range from a brief synopsis to detailed cast lists, historical reviews, and other information about a film. In addition, users also upload images including historical posters and stills or add comments. Site members also have the opportunity to request a film to be uploaded and offer some of their ratio to the user who fulfils the request. This dynamic of sharing ratio provides a reward to users for helping others and also strengthens the collection and the community. The site also has monthly themes in which users are offered bonus ratio to upload content related to a certain director, genre, era, or region. Past themes include "Yugoslavian Cinema Under Tito", "Joan Blondell", and "Cannibal and Zombie Movies". These monthly films help to diversify the collection and highlight different aspects of the collection.

Perhaps the most powerful and unique aspect of BC's crowdsourcing and curation dynamic is the collaborative efforts of users to provide custom subtitles for films not available in English. The creation of custom subtitles is a time consuming process and is in many cases the only solution to being able to watch and understand a film when the viewer does not understand the language of the film. In many cases, films that for decades were unavailable in English have now been given English subtitles. Jean Renoir's 1932 talkie, *La nuit du carrefour*, one of the lesser-known films in the director's oeuvre, was given custom English subtitles by a BC user and can now be enjoyed by a larger audience. My favourite example of these subtitling activities pertains to famed French silent film director Louis Feuillade's eight hour serial *Tih Minh* from 1918. The version initially uploaded to BC had French and Dutch intertitles, but did not have English subs, however that did not impede one user from translating the film, despite not speaking either French or Dutch. In a March 2010 post on the Criterionforum.org message board, user swo17 recounts how he created the custom subtitles for the film:

> "So, with a friendly online French->English and Dutch->English translator in hand, I spent the last week and a half gradually going through the film, meticulously typing in the contents of each intertitle card (every last accent and cedilla!), sometimes in both languages, making the most sense out of them that I could, and crafting English subtitle files out of all of this."

This almost absurd level of commitment is emblematic of what Gilbert describes as the contemporary cinephile "who is savvy about circumventing...obstacles to make it possible...to view films that are otherwise unavailable…[through the] extra-legal downloading of films, or the

93 *Merriam-Webster*, s.v. "Crowdsourcing," http://www.merriam-webster.com/dictionary/crowdsourcing.

process of making custom subtitles for un-translated works."[94] The cinephile audience that uses private trackers such as BC makes up a large and crucial force, driving much of the activity on the site, which in conjunction with the ratio mechanism allows the site to avoid stagnation.

7. How Do Community Members See Themselves?

As part of our research about BC, we surveyed users of the site to get a sense of their perception of who is using the site and why it is such a powerful tool. One respondent stated that the power of the site lies in its ability to allow users from around the world to have access to films previously available only to those in major film centres such as New York City. Another suggested that users of the site include casual film fans, collectors, cinephiles, and academics. One user identified himself or herself as a film programmer and noted that the content they downloaded from the site influenced their choices in what films they screen for the public. The potential for cross-pollination, where content from a private tracker is then made accessible in other formats, such as screenings, commercial DVD releases, or streaming is quite significant and remains underexplored. Some users we surveyed also pointed to the preservation role of the private tracker, suggesting that the digitization of films only available on formats such as VHS (and by doing so in the highest quality possible), qualifies as an act of preservation.

8. Private Trackers as Preservation Tools?

It is helpful to consider the digital preservation actions of the private tracker in relation to traditional notions of what constitutes film preservation. The U.S. National Film Preservation Foundation defines film preservation as "the full continuum of activities necessary to protect the film and share the content with the public."[95] With traditional archives and cultural heritage institutions often lacking the resources to make content widely accessible, one must consider that these organizations may be very successful at ensuring the long -term safety of a film print, but are falling short in terms of sharing the content with the public. Conversely, a private tracker such as BC has no capacity to preserve physical objects, but is an incredible tool for sharing digital objects. Through the acts of downloading and uploading, these objects are duplicated, disseminated, and stored on hard drives and servers around the world, which helps to ensure the potential for long-term preservation of each object.

9. The Development of Sharing Networks

The range of activities conducted within torrent communities, and the evolution of the sharing infrastructure involved, have progressed in recent years in tandem with developments elsewhere; from improvements in software and hardware to broader, infrastructural advances in internet services, all occurring in step with an ever growing base of users, supporting and contributing to repositories. The inchoate digital film archive is not standardised, nor its future safeguarded, but nonetheless it has developed, organically and incrementally, into a relatively concrete form. Attempting to assess the health of torrent communities online is complicated, not only by the limitations on access and visibility imposed by trackers but by the fluctuating shape of the online ecosystem, in which even sites that are — per Frucci's analysis[96] — "closed" may still effectively provide service - whether through new incarnations, their domain suffixes affiliated with more permissive territories; through dormant, cached links to content hosted diffusely; or in the reconstitution and circulation of their holdings under new protocols and in new contexts.

Among the factors dictating the shape of the contemporary archive, one at once present and conspicuously absent is copyright law. A general analysis of the legality of these archives un-

94 Andrew W. Gilbert, "Gender, Taste, and Cinephile Culture," (PhD diss., Roosevelt University, 2013), 23. http://search.proquest.com/docview/1356849369.

95 National Film Preservation Foundation, *The Film Preservation Guide: The Basics for Archives, Libraries, and Museums*, (San Francisco: National Film Preservation Foundation, 2004), 4.

96 Frucci, "Secret World."

der American copyright law is relatively straightforward, informed by U.S. Code Title 17 and affirmed by the results of file-sharing litigation unfolding since the turn of the century. The distinct activities involved in circulating copyrighted works online without the permission of a rights-holder — as an uploader; a downloader; or as a third party, facilitating these transmissions — each violate various protections afforded to the rights-holder under the act (the right to reproduce the work; to prepare derivative works; to distribute copies; to perform or display the work publicly[97]), applicable to a vast majority of artistic works created. While caveats to the act regarding the "fair use" of material — generally undefined enough to allow for some interpretation as to what might constitute such use[98] — present exemptions from strict compliance with restrictions on reproduction and display, it is reasonable to state that a straight reading of the act would find (and repeatedly has found) many instances in which obtaining a film online would be a breach of the law. With reference to the proportion of work covered by regulation, writer James Boyle has claimed that 95% of the culture created in the twentieth-century is protected by copyright provisions that make it unavailable,[99] whether because it is out of print, out of circulation, or still tied to licensing agreements preventing its reproduction.

As such, in considering the legal situation of the online film repository, it is perhaps more valuable to consider the law as it is practiced, rather than written. The infringements described above have usefully been described as "low-risk violations," a term conceding that such activity violates copyrights, while acknowledging the pragmatic obstacles limiting consequences for users. The strategies employed in recourse to copyright violation in the internet era have varied in scale and efficacy, evolving in response to the various techniques developed to avoid detection; in reference to the particular activities associated with circulating 'cinephile' content online, one significant factor influencing the relatively modest risk is the limited immediate commercial value of the holdings circulated, making pursuit of violators a concern secondary to the attention focused on large-scale piracy of studio productions.

More generally, the nature of digital content has highlighted the inadequacy of litigation as an effective means through which to respond to piracy. The labour and considerable expense involved in drafting a cease and desist letter — which might succeed in targeting a specific distributor of a pirated work, but which would not address subsequent circulation of the work, incompatible with the various scales and territories in which this occurs — has often proved equivalent in effect to action taken informally, whereby a rights-holder's wish that content be removed is expressed, but without the explicit threat of legal action. The consequent suppression of content stolen or liberated from the archive is best measured not by its availability or unavailability, but by the degree of ease involved in locating it — whether it can be retrieved promptly through a Google search, or is restricted to clandestine quarters, requiring registration, membership or extensive navigation to find it.

10. Stepping Out of the Shadows

It is valuable, then, to assess whether the needs that private digital repositories meet might also be met outside of the conflicted terrain they currently inhabit — illegal but widely used, circulating material but subject to restrictions. Two enterprises pertinent to this assessment, and worthy of comparison here, are the Internet Archive and UbuWeb.

Archive.org, the Internet Archive, is the non-profit archive "working to prevent the Internet … and other "born-digital" materials from disappearing into the past"; its myriad projects encompass significant collections of material, across varied media, chronicling cultural activity,

97 "Copyright Law of the U.S.A. and Related Laws Contained in Title 17 of the United States Code", *United States Copyright Office*, 2014, http://www.copyright.gov/title17/92chap1.html#1-38.
98 "Copyright Law of the U.S.A. and Related Laws Contained in Title 17 of the United States Code", *United States Copyright Office*, 2014, http://www.copyright.gov/title17/92chap1.html#1-40.
99 Voyce, Stephen. 2011. "Toward an Open Source Poetics: Appropriation, Collaboration, and the Commons." *Criticism* 53 (3): 407-438.

"from ephemera to artefact."[100] Popular, visible projects hosted by Internet Archive projects, such as David Pierce and Eric Hoyt's Media History Digital Library,[101] are designed to adhere strictly with the copyright terms of the material contained, representing only the parts of the collection that have passed into the public domain, in the case of the Media History Digital Library making available the issues of journals whose period of copyright protection has expired or was not renewed.[102] Additional collections include user-contributed material and "orphaned" films, occupying a more complicated rights position. Since 2012, the Internet Archive has operated two trackers, facilitating the distribution of more than five million items using the BitTorrent protocol.[103]

The website UbuWeb was established as a resource for avant-garde cultural material, growing to accommodate a variety of film and moving image content, historically having provided access to seminal work by artists like Samuel Beckett, Man Ray, and Nam June Paik. Considering the mandate of the site, and the copyright status of works held, founder Kenneth Goldsmith has said, "If it's out of print, we feel it's fair game. Or if something is in print, yet absurdly priced or insanely hard to procure, we'll take a chance on it."[104] The content available exists in constant flux, its library growing but also, occasionally, changing; UbuWeb's mission to make out-of-circulation works available has in some cases sparked a conversation with rights-holders, in which permissions were negotiated in response to the objections of creators. One example of this is the site's selection of works by avant-garde Canadian filmmaker Michael Snow: Goldsmith recalls that Snow reached out to the site to ask that certain films hosted be removed, while approving the exhibition of others; per Goldsmith, "Having two permissioned films from Michael Snow beats hosting ten without his blessing."[105] UbuWeb's highly visible, public display of work previously restricted by copyright protections challenges the validity of those protections, accentuating their limitations as well as their values, interrogating whether automatic protection correlates with broader concerns regarding intentionality and access. The site is a compromise, boldly attempting to move works towards exhibition while cognisant of the opportunities and risks posed by this action.

Discussing the use of archival holdings within an institutional context, archivist and filmmaker Rick Prelinger has described access as "overwhelmingly crippled by an overzealous application of the precautionary principle."[106] Attempting to effectively navigate the varied gray space around copyright presents challenges to already under-resourced archives, whereas embracing straightforward adherence to the strictest interpretation of the law is good policy, negating the risk imposed by potentially ruinous punitive measures. Generally, both under the law and in practice, the individual circumstances of an item or collection will dictate the feasibility of sharing it more widely. However, we believe that it is important to recognise the new reality under which much copyright-protected content within the archive exists: a great many restricted items are no longer truly "unavailable", per the terms of their copyright, but instead are available selectively, either to those with establishment affiliation or credentials, or to those both literate and privileged enough to be in a position to navigate unofficial channels to retrieve derivative copies. The example of UbuWeb is instructive, as much for its dialogue with featured artists as for its partnership with institutions like WFMU and PennSound at the University of Pennsylvania, contributors of "technical, moral, and spiritual" support,"[107] making possible the site's mission. Between the conversational, activist model of UbuWeb, and the Internet Archive's position as the vanguard of

100 "Internet Archive: About IA", *Internet Archive*, 2014, http://archive.org/about/.
101 Media History Digital Library : Free Texts : Download & Streaming : Internet Archive, *Internet Archive*, 2014, https://archive.org/details/mediahistory.
102 Media History Digital Library - Online Access to the Histories of Cinema, Broadcasting & Sound, *Media History Digital Library*, 2014, http://mediahistoryproject.org.
103 Internet Archive Frequently Asked Questions, *Internet Archive*, 2014, https://archive.org/about/faqs.php#320.
104 U B U W E B :: Frequently Asked Questions, *UbuWeb*, 2014, http://www.ubu.com/resources/faq.html
105 Goldsmith, Kenneth. "An Open Letter to the Frameworks Community", *UbuWeb*, http://www.ubu.com/resources/frameworks.html.
106 Prelinger, Rick. 2007. "Archives and Access in the 21st Century." *Cinema Journal* 46 (3): 114-118.
107 "U B U W E B :: Partners", *UbuWeb*, 2014, http://www.ubu.com/resources/partners.html.

digital archiving, the shape of a feasible and legitimate digital film repository begins to materialise — one that might provide access to material where copyright is deemed flexible, and under conditions sensitive to the context in which works are displayed. While acknowledging a tension that has long existed between rights owners and audiences, and recognising the complexity of the decisions faced by custodians, it is our hope that the infrastructures developed to circulate film material might be adopted and appropriated to facilitate broader access to the archive.

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Images

TOWARDS AN OPEN AND ACCESSIBLE SOUND AND AUDIOVISUAL ARCHIVES: CASE STUDY OF ZIMBABWE

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Sound and audiovisual archives are critical media for the storage and preservation of an institution or a country's intellectual and cultural heritage. As the world moves towards the knowledge economy it becomes imperative for all countries to prioritise the proper management of sound and audiovisual archives as a way to preserve cultural capital for posterity. This paper will examine the strategies that are in place to facilitate easier access to sound and audiovisual archives. The writers will also explore the dynamic nature of users with diverse with regards to basic and digital literacy. It will also highlight the challenges that the country's National Archives is encountering in the management of sound and audiovisual archives. It will highlight the factors that are impeding proper management of sound and audiovisual archives at the National Archives of Zimbabwe. It will examine the aspect of sustainability with regards to providing access to sound and audiovisual archives. The article will explore the prospects for migrating from traditional to online access. It will also explore the aspect of collaboration through Public and Private Sector Partnership to facilitate wider and easier access to sound and audio archives. The treatise will also explore the prospects for migrating towards digital technology. It will also come up with recommendations to improve access to sound and audio visual archives in Zimbabwe.

Keywords: *knowledge economy; open access; restricted access; universal access; sustainable development.*

Introduction

Information and Communication Technologies (ICT's) are making it possible to widen and deepen access to sound and audiovisual materials irrespective of distance and time. Information management technological convergence has made provision for different types of content (data, audio, voice, video) to be stored in the same format and delivered through a variety of technologies (computers, mobile phones, television, including social media platforms) or to be executed in different e-platforms. The United Nations Development Programme (UNDP) (2001) (Section 2:1) defines ICT's as "….powerful enabler of development…." Such technologies are highly rated because of their potential in transforming all aspects of life. During the late twentieth century, the United Nations passed a recommendation in recognition and support for the role of moving images as an expression of the cultural identity of peoples, and their educational, cultural, artistic, scientific and historical value as an integral part of a nation's cultural heritage. The use of sound and audiovisual archives as sources of knowledge has become a key component of business, culture, education and wealth generation. Hill (2012) notes that the recording of sound and audiovisual archives dates back to colonial era and such records have become the accumulated heritage of the collective national memory of nation states, critical to the sustenance of the collective history and conscience. They are also the key pillars of a nation's intellectual and cultural capital in the knowledge driven age.

Background Information

It has, thus, become imperative that as developing countries move into the knowledge economy, emphasis should be placed on strengthening cultural creativity and innovations which are critical factors of cultural identity, wealth creation and economic growth according to Watson (2010). Houghton and Sheehan, (2000) define the knowledge economy as one in which the generation and the exploitation of knowledge plays a prime role in the creation of wealth. Effective exploitation of knowledge is now at the epicenter of economic growth and archives, libraries, galleries and museums as cultural institutions are reinventing and redefining their roles in the complex and dynamic dispensation of ubiquitous computing. Knowledge economies are characterized by openness, knowledge generation, knowledge transfer, sharing and mobilization, and intensive cultures of continuous learning and transformation according to

Carr and MacLachlan (2005). Sound and audiovisual communication has been critical in transmitting and perpetuating culture since time immemorial and this justifies the need to put in place technology driven mechanism to ensure efficient access to such resources, for example, revising and enforcing bibliographic control laws as will be highlighted in the next section.

Legal deposit in Zimbabwe is provided for through the National Archives Act 22/2001 and Broadcasting Services Act (2001) which covers both print and non-print resources. The National Archives Act 22/2001 Section 3 specifies that *"The National Archives established in terms of the repealed Act shall, subject to this Act, continue in existence for the storage and preservation of public archives and public records and shall be known as the National Archives of Zimbabwe."* The Broadcasting Services Act (2001) Section 41(b) stipulates that every broadcasting licensee is bound by the law to "*...provide a copy of each of its programmes free of charge to the National Archives of referred to in section 3 of the National Archives of Zimbabwe Act...*". The major challenge is the enforcement of such laws to ensure that there is compliance from publishers, printers, broadcasters, writers and all those involved and concerned with content production and publishing. There is limited training in the handling audio visuals materials in library and information sciences schools, hence the need for a fundamental rethink.

Jules (2003) posits that it is quite a challenge for cultural institutions to rely on goodwill *(uberima fath)* to ensure the comprehensiveness of deposit collections and this justifies the need for adequate mechanisms to facilitate compliance and enforcement. Lariviere (2003) further states that there is need to educate stakeholders on how the legal deposit act operates and benefits that accrue from compliance, for example, increased visibility, wider publicity of publications, effective bibliographic control and long term guarantee of availability of original copies in the event that disaster strikes. As such, memory institutions should proactively educate their key stakeholders about the advantages of compliance to the strengthening of the collective conscience of the nation. Compliance also ensures the longevity of physical and digital cultural memory which serves as a bulwark against cultural haemorrhage.

Matangira (2003:44) states that even though most countries in Southern Africa have made significant strides in the management of paper documents, the same cannot be said with regards to audiovisual archiving which still has a long way to go for it to be properly defined and clearly spelt out for operations to take recognizable shape. The author further states that there has been a growing interest in ensuring proper management of audiovisual archives within the Southern African Region because of the growing interest in multimedia technology and the fact that audiovisual material encapsulates vital information and knowledge critical in socio–economic transformation.

Rooks (2010) notes that in the United Kingdom archival recordings dating back to the 1940s reveal a very clear sense of the historical importance of sound recordings, heightened in wartime, and the deeply held desire to ensure that people in the future would be helped to understand the life and times of their ancestors through sounds and voices. Similarly, Zimbabwe's history is reflected in the Chimurenga files and other sound and audiovisual archives that should be preserved for the future of the nation. It is interesting to note that while nations pride themselves in creating and maintaining a historical record of sound audio archives, there is no matching interest in the preservation of such cultural heritage for posterity. Moyo (2002) noted that there is a strong correlation between access and preservation, since the two cannot be divorced from each other. The author views preservation as the holistic scheme that treats not only the indicators of damage but goes further to correct the fundamental causes. However preservation should also include the strategies to preserve technologies used to preserve sound and audiovisual archives.

Audio and visual materials are by nature fragile. The question then become of preservation. Edmondson (2003) notes that preservation is critical in the management of sound audiovisual archives because it ensures permanent accessibility to sound audiovisual archives. The author views preservation as the sum total of processes, principles, attitudes, facilities, and activities that are critical in ensuring permanent accessibility to audiovisual archives. Leary (et.al) (1988)

posits that preservation is a particularly critical responsibility of audiovisual archivists since audiovisual records are generally more perishable than paper and their preservation costs per unit are so relatively high. The author further notes that effective preventive maintenance involves protecting audiovisual records from improper storage and improper use, and recognizing the signs or deterioration in time to lake corrective action. Leary (et.al) also states that audiovisual records unlike print based archives are characterised by multifarious and assorted attributes which poses challenges with regards to handling, storage, and preservation.

Accessibility refers to any form of use of an archives collection, services, and knowledge including playback in real time of sound and moving image holdings and reference to sources of information about sound and moving image holdings and the subject areas they represent. Ngulube (2005:154) states that when national archivists or national librarians select and acquire materials they should ensure that the materials will be available and accessible over time. The author highlights the critical role of environmental control and monitoring as key strategies in the drive to preserve audiovisual archives for permanent accessibility .The author warns archivists and librarians to take precautionary measures to ensure that access to archival material will always be guaranteed.

Pearce-Moses (2004) defines environmental control as "the process of creating and maintaining storage or display conditions appropriate to protect material from adverse effects of temperature, humidity, air quality, light, biological infestation, as well as human risks associated with housekeeping procedures, security, and fire and water damage." "A record if it is to be useful to science must be continuously extended, it must be stored, and above all it must be consulted. Today we make the record conventionally by writing and photography, followed by printing; but we also record on film, on wax disks, and on magnetic wires. Even if utterly new recording procedures do not appear, these present ones are certainly in the process of modification and extension ..." Vanessa Bush (2001).

Bettington (2008:575) states that preservation should be viewed as an ongoing process whose main objective would be to acquire and capture the best attainable copy or format; retain originals in safe and sustainable conditions; copy items without loss of quality; record and retain bibliographic details, supporting documents, and metadata; and ensure safe access to the collection among others. Zinyengere (2008) states that "audiovisual records are vital elements of our collective memory, determining our achievements over the years, documenting our past, present and determining our future." Such archives should be preserved because they bear testimony to the successes and achievements of a nation in its endeavour to realise freedom. Preservation and conservation become an important venture, which requires an investment of institutional human capital.

The National Archives of Zimbabwe was founded through an Act of Parliament in 1935 and operates under the National Archives Act of Zimbabwe 1986. It is the official custodian of the country's cultural heritage and this is made possible through the enacted National Archives Act of 1986 which empowers the Director to acquire and preserve records. Zimbabwe is one of the countries in Sub Saharan Africa whose Archival legislation has its roots in the colonial era. The Act prohibits the removal of public archives or public records from Zimbabwe and it also ensures the protection and preservation of historical records by forbidding the destruction of such records without the consent of the Minister of Home Affairs. Legislation is critical because it provides the National Archives with legal basis to deal with records and archives of public entities such as central government, local government, and parastatles. It also covers the legal aspects of destruction, the role of national archives in relationship to private records and historical manuscripts, as well as legal deposit. Its main mission is to acquire, preserve and provide access to documentation in whatever format reflecting the legal and historical record of Zimbabwe's past and present.

Matangira (2003:45) states that while the National Archives of Zimbabwe was opened in 1935, its Audiovisual section was opened after independence in 1988. The author states that prior to this audiovisual archives were dumped in the library without proper storage conditions until

when the new Records Centre was opened in 1988 and space was created for an audiovisual archives with proper storage conditions for films.

The International Federation of Library Associations and Institutions (IFLA 2007) define audiovisual as those artefacts relating to "sight and/or sound" and audio material as "any recorded sound and/or moving and/or still image items." The same institutions are explicit on the importance of providing unfettered access to information in whatever format "...as information providers should be concerned with the provision of information in the formats most suited to the differing needs of various types of users, each of which must be clearly differerianted...." The author notes that globally much of sound and audiovisual archives are not available commercially, and recommend that such recordings should be preserved for future use by researchers and scholars. The proper storage and handling of sound audio archives including cylinder recordings, discs (shellac and vinyl), magnetic tape and wire, and digital recordings should be given priority and strategies formulated to re-record content onto newer formats to overcome technological obsolescence.

Objectives

I. Examine the laws that facilitate legal deposit of sound and audio archives in Zimbabwe;
II. Highlight strategies to manage audiovisual archives;
III. Explore challenges and opportunities for managing sound and audiovisual archives; and
IV. Recommend ways to enhance access to audiovisual archives.

Methodology

The researcher used a qualitative design to study the research topic. The researcher triangulated methods through using observation and interviewing the archivists involved in the management of sound and audiovisual archives. Furthermore the researcher made use of documentary evidence to give the research a scholarly dimension as evidenced by the literature review. This is an empirical inquiry relying on multiple sources of evidence, for example, the documentary sources, observation, and interviews. The research site was the National Archives of Zimbabwe in Harare. The target population included records management officers and archivists responsible for sound and audiovisual archives. These are personnel who are involved in the management of sound and audiovisual archives.

Findings and Discussion

Matangira (2003) highlights the challenges of providing access to sound and audiovisual archives, for example, she cites complexities in handling, preservation, and provision as compared to paper. Matangira (2003:44) highlights the challenges of managing audiovisual archives within the Eastern Southern African Regional Branch of the International Council on Archives (ESARBICA), for example, lack of basic infrastructure and inadequate technical skills to effectively manage audiovisual archives. Abankwa, (2009) states that South Africa, has a vibrant National Archives of sound and audiovisual recordings and plays a key role in the International Association of Sound and Audio Archives (IASA). Matangira (2003) argued that many sub-Saharan African countries were still wrestling with the issue of establishing sound and audiovisual archives. The authors acknowledge the importance of audiovisual material as being useful for educational, historical, and cultural research and teaching purposes. Africa has a rich oral background which can be leveraged through an inclusive and progressive sound and audiovisual archival strategy. The African art of conversation reflects the richness of the oral tradition and the potential for developing sound and audiovisual archives. Zamon (2012:16) states that providing access to archival material is a central part of the function of the archives and archivist: "Providing access to collections means reaching out to researchers and showing them what the archives has and what the archivist can do for the researcher."

Ugbah, Ogunrombi, and Ameh (2012) also note that sound and audiovisual archives are critical in education and hence the need to develop collection development policies to manage them effectively. The author further notes that while the National Archives of Zimbabwe was established in 1935, the audiovisual section dates back to 1988 when it became imperative to archive such resources which had been previously ignored. The audiovisual collection had

grown significantly thus prompting management to open an audiovisual unit with proper storage conditions for such material. The audiovisual archive collection consists of microform, posters, gramophone records, videos, slides, audiocassettes consisting of music and oral history interviews, reel-to-reel tapes, and CD ROMs, among others. It also consists of Voice of Zimbabwe Programmes which were broadcast from Mozambique by exiled political leaders during the liberation struggle. The collection includes songs, speeches produced during the liberation struggle, and interviews with those involved in the liberation war including key personnel from the civil society and government.

The sound and moving image collection includes reel-to-reel tapes covering the colonial period, the liberation struggle, as well as contemporary times. Some of the issues covered are interviews on chieftainship, liberation struggle, indigenous culture, marriage, and religion. Gramaphone records encompass the music of the second half of the twentieth century covering major genres, for example, pop kwela rock and roll and traditional African music. There are a total of 10 000 Gramophone records acquired from the Zimbabwe Broadcasting Corporation (ZBC). This collection which includes videos, slides, and audiocassettes is now part of the sound and audiovisual archives. The moving or visual collection consists of 3 000 titles of films or bioscopes dating back to the colonial era (1940). The film collection was acquired from the Ministry of Information and it includes material from the colonial and post-independence era. This collection can be classified by gauge and material, for example, it includes 16mm and 35mm films of nitrate and polymers. However, the National Archives should be careful of what it acquires by way of donations. Many audio and visual productions are now taking place. There are timeless productions which become part of culture. These must be carefully selected and preserved because they will be used in the future.

Matangira, (2003:44) recommends that audiovisual archives should develop collection development policies to cover collection development and management with reference to acquisition, collection building, preservation and provision of access to such collections. The author views this as a great challenge and is optimistic that such a policy will guide archivists and other stakeholders and that it will serve as a supporting framework through which all collection development decisions can be judged and tested.

Ngulube (2006) states that access to archives should be considered in the context of bibliographical, physical, and intellectual parameters. Access is the *raison d'etre* for archives without which there would be no archives. Access is critical for research and education interests of the users. The author posits that physical access is determined by operational factors, for example, hours of service versus hours of closure, example regulations, and legal framework with regards to national security, public order, and public morality; while bibliographic access has to do with the use of finding aids or retrieval tools and the use of bibliographic standards; and intellectual access is determined by language use. Edmondson (2009:31) posits that the pervasive nature of ICT 's has led to the convergence of technology through presenting intersected versions of words, images, and sound through a widening range of devices.

Bettington (2008) notes that appraisal of audiovisual archives poses serious challenges because traditionally the source of value has been derived from aesthetic, informational, and cultural content. But with current trends relating to portable recording equipment, audiovisual archives are widely used as evidence gathering tools thus giving prominence to evidential value. Matangira (2003) recommends that archival institutions involved in the management of sound archives should formulate collection development and management policies covering such issues as acquisition, collection development, preservation, appraisal, and provision of access to the collection. Rooks (2010) states that in the modern day world access is steadily becoming more of an online experience than a mere visit to a monolithic brick and mortar edifice. Audiovisual materials have easily become the common choice of the citizenry for accessing information. It is easier for the citizenry to access these materials via different platforms. The National Archives need to tap into the use of technology available to make access easier. The use of the Internet to make available the resources is one of the ways through which the National Archives can make access easier.

Conclusion

Investment in ICT's should enable the National Archives of Zimbabwe to digitise its collection and thus widen and deepen access to support learning, teaching, research, and social-economic development. Sound and audiovisual collections should be prioritised through viable archival management systems that can leverage cultural creativity and expressions for the benefit of Zimbabwe and beyond. Documentation of traditional music and dance as well as animal sounds can serve as useful and progressive initiatives for the perpetuation of culture in a globalised world where identities still matter. Even though we can share sound and audiovisual artefacts with others, it is imperative to dance to ones' own song and hence the need for an open and accessible sound and audiovisual collection deeply rooted in the cultural ambience and struggles of the people for the benefit of humanity. Sound and audiovisual archives should be where living species live, hustle, and carry on their daily living routines to survive.

Recommendations

I. Legal deposit laws for sound and audiovisual archives should be continuously revisited and aligned to international trends and best practices with regards to enforcement or compliance;

II. Align sound and audiovisual management to the local cultural ambience and aspirations of the people to preserve their sound and audiovisual heritage;

III. There is need to move towards e-management of sound and audiovisual archives, for example use of technology to share space and other resources;

IV. Promote convergence of archives and related institutions in proper management of sound and audiovisual archives; and

V. ICT's should be viewed as an opportunity to strengthen sound and audiovisual archives.

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AUDIOVISUAL KNOWLEDGE MANAGEMENT AND THE FEAR OF LOSING CONTROL

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1. Introduction

In the past, knowledge of any kind was monopolized by a few high ranking persons of a community. Since technology has enabled people of all social layers in nearly all regions of the world, the problem of monopolization is becoming increasingly repressed. However, in dealing with knowledge and its status, cultural diversity is still reflected in societal behaviour and reproduces historical conditions regarding audiovisual archiving even now. This paper documents the process of implementing a small-scale university AV archive and the many contradictory issues in dealing with it as a working tool, as a knowledge property, as a place of higher or lower levels of safety, and as the troublesome memory of academic fallacies.

From a critical perspective, the way keywords and basic bias work is described, including its effect on the implementation process. In conclusion, an open strategy is proposed to identify culturally determined perspectives in contrast to individual understandings in this matter. The material used was collected through a two-year university project at Universiti Putra Malaysia and subsequent discussions.

Not even 100 years ago, the only person of the village who had a 'vision' was the shaman. He could see what others could not. The shaman was said to be the seer and the hearer of the outer world. His power depended on this belief nurtured through common people's interpretation. Anything the shaman uttered was taken seriously. In other places, religious leaders, respected monks, those who could read and write were an alternative source of knowledge beyond the daily life experience. However, the monopoly on knowledge was well confined to persons who derived their power from it.

2. One Case

I just had an insightful talk with one student who submitted an interesting paper to a book series we publish annually. His main subject is a video production of two minutes and two seconds length, a musical parody on a university incident that was put on YouTube and richly commented on by Malaysian netizens. In order to provide the reader with full details, he asked the video producer for permission to include this video into the audiovisual supplements coming with each number of the book series. The producer not only allowed him to use his video, but he also sent him a high-resolution version in order to secure the best possible quality for publication. The student then asked me how to do in-text references of this video and I recommended him to archive the video first in order to use the unique archive code as reference in addition to the name such as "([name of video producer], ARCPA 3821)". In the videography he has to provide the full reference and give sufficient acknowledgments as usually required for the database of the archive.

The student hesitated. His argument was that he did not let the author know about being archived, so the author may object to it. He found it unethical to proceed without informing the donor and asking for consent regarding this 'new' or 'different' situation and he somehow felt that he could not ask him for that. Further he found it unethical of me to ask him directly, since that would imply doing something behind the author's back.

We had the following conversation:

- Do you think that the author believes we can control all people who will buy the book?
- *No, but that is fine. He knows that the book will be sold.*
- What is the difference between being 'out of control' on the book market and being archived with unaltered rights and acknowledgements in an archive that can control access onsite?

- *It is that the author does not know it. I should ask for his permission again.*
- Do you know that anyone who buys the book with the AV supplement can archive the files stored on the DVD for safety reason on another carrier? I will have to do it after publication as well in order to ensure the safety and accessibility of the files in case of re-prints or re-editions. That is my duty as an editor.
- *But that is unethical!*
- I feel that it is unethical to keep a file sent to you for the purpose of publication and subsequently 'uncontrollable' distribution on your private computer thus making any further developments depending on you.
- *But I was the one who asked him to send it and he sent it to me. He trusts in me.*
- So, if you feel responsible for the well being of the file, you should archive it. And if you think that this is unethical, you may restrict access for onsite view only. But then you should ask the author whether he agrees with this restriction.
- *Hm. [I have to think about that.]*

This twist of argumentation is typical for the small university AV archive project, called Audiovisual Research Collections for Performing Arts (ARCPA).

3. Knowledge Management as Theory

ARCPA was started in 2011 when a group of researchers at the Faculty of Human Ecology of Universiti Putra Malaysia took up an explorative research project on the feasibility and the impact on research and creative art works of a small scale audiovisual archive within the faculty's music department.[108] Two years later, the archive was installed as a "one site entry and access archive" equipped with all playback units necessary for digitization and dependable networking supported through the university as the storage provider. Since the project started, 14 archiving persons, mostly the collectors themselves, registered 69 different recording persons with 28 different declarations of legal status. To date, 2,576 entries have been made and more than 3,000 items from other archives or storage departments have been deposited for unrestricted onsite access. The archive is used by many students and some staff as well as by outsiders to the university. ARCPA is operated by temporary users such as graduate students, visiting researchers, and staff in order to increase the physical safety of their recordings and teaching materials and to document the legal status of works jointly produced with musicians, performers, and colleagues in the field. Database entries are created and maintained by the main collectors themselves under the guidance of a voluntary archivist on duty. Copyright and legal status or resulting claims are not altered through the archiving process. Most of the audiovisual documents belong to university grant funded projects and are therefore controlled legally by the university. However, the main agents, the recorded musicians and performers, are the primary copyright holders. The main collectors, mostly the project leaders, but also the primary copyright holders, may restrict access to documents for certain purposes or persons. However, the archive strives for long-term accessibility[109] since the main idea is to re-use and to effectively exploit existing audiovisual documents for research and educational purposes.

4. Fear in Reality

Fighting with highly sensitive issues caused through culturally different approaches to archiving and access, the archive cannot yet be seen as a safe place for knowledge management.[110] Coming back to the example given above: What does the story of the student's query imply?

- Archiving is more dangerous and uncontrollable than publishing. (You may ask somebody to be published but not to be archived.)
- Archivists can do worse things with archived items than publishers.

108 Musib, Jähnichen & Meddegoda, 2014.
109 Seeger, 1996; Willinsky, 2009.
110 Jähnichen & Musib, 2012; Jähnichen, 2014.

- Accessibility of an archive is unlimited through file duplications while publishers may just stop publishing the item, then it will not be distributed anymore.
- Archives deal with rights differently than publishers.
- The purpose of archiving remains unclear and unforeseeable.
- An archive is like an evidence room of the court; things cannot easily be put in or removed. Therefore, they are not flexible and can become a hindrance in development.
- While agreeing on publication, the publisher will bear a part of responsibility, but in an archive things are not transparent regarding responsibilities. No one knows what could happen in the future.

If we put this list of statements into a table and include two columns — the suspected danger for being part of a book publication and the same for being included in and AV archive — and rate them on a scale from 1–5, then we come to this result:

Risk	Being part of a book publication	Inclusion in an AV Archive	Unpublished and stored on home PC hard drive	
			As expected	In reality
Uncontrollable	5	1	1	5
Not to be trusted	3	3	1	3
Access can't be stopped	5	1	1	1
Insecure legal rights	3	1	1	5
Unclear and unforeseeable purpose	1	1	1	3
Not flexible, hindrance in development	5	1	1	3
Not transparent regarding responsibilities	1	1	1	5
Risk (the higher the number the higher the risk)	23	9	7	25

The fear of losing control seems to be widely irrational. However, AV archives have to struggle with this irrationality that is culturally patterned and cannot be reduced to simple misunderstandings.

Another example can illustrate even better which nature of fear we have to deal with and what could possibly cause it.

5. Other Cases

On 15 June 2013, a group of researchers attended a recording session in a Malay wedding and an evening rehearsal. The musicians called themselves Nobat Nafiri Melaka. One of the researchers intended to write a thesis about these musicians, the others were asked to help with the recordings. While the wedding went on, the music performed was taken from a broad traditional entertainment repertoire re-arranged by the Nobat Nafiri musicians. The evening rehearsal was mainly to instruct younger musicians in traditional court music pieces that have to be learned entirely by heart. The place for the rehearsal was outside the state Melaka for some special reason. Since Melaka has no court and no Sultan or any other state representative besides the elected governor, court music cannot be played in Melaka. The musicians, who all

live and work in other serious professions in Melaka, especially in Kampung Cina, have to go to the neighbouring state Negeri Sembilan in order to play court music. The rehearsal house is attached to a piece of land owned by a relative. The rehearsal takes place only in the darkness. The house consisting of one room, where the instruments are stored and an attached terrace with roof, where the musicians sit and play, is also a meeting point for villagers nearby who come in search of advise and cures. Besides the rehearsal house, there is another one-room house on stilts, where cooking utensils and construction materials are stored. This house is also used for so called bomoh activities, healing rituals that are conducted by the eldest Nobat Nafiri member. The recordings were brought to the university archive and documented. A set of copies was taken by the researcher who is writing his thesis. Since then, nothing happened. No thesis is written yet and no access should be given unless this occurs. However, another member of the recording team mentioned in a public meeting the fact of having heard a Melaka Nobat Nafiri group and was harshly criticized. Since Melaka has no court there cannot exist any Nobat group. Later, the researcher who was writing his thesis took this incident as a reason to decline his enthusiasm by saying that his research data were stolen and openly distributed thus his writing would not be of unique value anymore. The data collected and the knowledge retained seemed to go nowhere.

And another example of frustration is the entire collection of a very famous Malay storyteller, Said Aripin, unfortunately also one of the last of his kind. He was the first to have performed in London's Albert Hall as one of those people of public importance that were invited to Great Britain after proclaiming the independence of Malaya. The storytelling was conducted on university ground during three nights with private technical support and some small funding for recording material and catering. The text of the sung stories was later transcribed in a handwritten manuscript by a student who voluntarily wanted to help the head of the department. Since then, seven years ago, nothing has happened. The manuscript was not even typed into a computer in order to support the documentation. It is also privately secured and inaccessible. Nobody can do research on it unless a financed project is approved. Students are discouraged to listen to the recordings and any further discussion is stopped.

These two cases illustrate the tragic patterns behind the activities. Knowing that only audiovisual archiving can secure an important part of any performance practice[111], technical equipment and knowhow are very much asked for. Once the 'items' — recordings — are created, the interest in them declines rapidly. The items seem to become suddenly troublesome and a burden for the administration. They are quickly stored away as 'project outcomes' and 'research reports'. While owning items is widely accepted and obviously presented as research achievement, sharing is seen as unethical because sharing is considered as a matter of personal attachment to the items that can only be exchanged between intimate friends. Any other free sharing for the sake of increasing wisdom on a subject is a sort of betrayal.[112]

6. Conclusion

Analysing the three cases presented here, we can summarize that knowledge, as something to live and to grow through sharing, is not an appreciated value in the currently practiced academic culture of Peninsular Malaysia. Knowledge is widely seen as an asset in personal promotion and an achievement assigned to its owner, in this case of the audiovisual 'items.' Therefore, audiovisual items cannot be simply included in an archive and if so, not simply be accessed unless the owner — actually the one who was responsible for conducting an approved and financed research programme — agrees graciously upon it.

The real situation of acknowledging rights in documentations and references does not change this situation, because the power of a project leader is mainly based on dependencies of co-researchers, mostly graduate students or colleagues of lower rank. The power balance decides

111 Mills, 1996, Massey & Stephens, 1998.
112 Jähnichen, 2014; Jähnichen & Meddegoda, 2013.

finally whether a collection can be used successfully. Culturally, this situation is still far from what audiovisual archiving might be in other areas of the world.

Interestingly, among the musicians recorded, the people who help in arranging sessions and meetings with performers in the communities are much less affected by academic considerations of power relations. They are very often disappointed by not becoming known through archiving activities and by not being included in the discussion of resulting knowledge.

However, even if we state certain sociophobic behaviour, conducting AV archiving in a Malaysian university seems to be a long term undertaking in terms of determination and stubbornness. Every year a challenge, every teaching hour a very small step into an open minded world in which knowledge cannot be monopolized or hidden, in which knowledge invites creative spirits to contribute without hesitation.

The hesitation and the way of hiding is the result of social condemnation, the many years in which knowing things or having seen things could be only powerful in the hands of a few leaders and otherwise quite harmful. The remaining distortion derives from barely movable academic structures and a working design that affects all types of knowledge, not only knowledge that comes with AV documents.

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ARTISTS, ARCHIVISTS, AND COMMUNITY

Heidi Stalla
Diana Chester

> *The composition is the thing seen by every one living in the living they are doing, they are the composing of the composition that at the time they are living in the composition of the time in which they are living. It is that that makes living a thing they are doing. Nothing else is different, of that almost any one can be certain. The time when and the time of and the time in that composition is the natural phenomena of that composition and of that perhaps every one can be certain.*
>
> Gertrude Stein

In December 2014, artists Diana Chester and Dhanaraj Keezhara put together the exhibition, *Every Day Life: A Repertoire of Ritual & Performance*, depicting the lives of Theyyam performers in the village of Keezhara, in Kerala, India. The exhibit draws on archival sound recordings of Theyyam, a ritualistic Hindu Festival, from which Chester composed an immersive sonic environment to match Keezhara's visual compositions. Theyyam performers are traditionally members of a low Hindu caste who have passed down the stories, performances, dances, songs, costumes, and traditions of the festival from generation to generation. Whereas local audience members typically think of the performers in absolute terms (either elevated like gods in their roles as characters of Theyyam, or else as Pulayas, members of a low caste), Chester and Keezhara sought to redirect this gaze by illuminating the lives and activities of the real people who make Theyyam happen.

The two artists are longtime collaborators. They work together to choose compelling moments of everyday experience, create still-life images from these moments, and then highlight the formal properties that best represent the essence of the experiences. They then use these formal properties as maps to create artistic representations in their respective mediums. For example, in one image that was featured in the exhibition a bamboo stick looms large on Keezhara's canvas, bending under the weight of a silver-white fish. This image corresponds to the approaching footsteps of fishermen bringing the day's catch back to temple. The footsteps are heavy and uneven, sonic echoes of the bend and weight of the bamboo pole. In this case, Keezhara and Chester capture an end-of-day moment that feels weighty, yet also brisk and energized, catching and holding the viewer in a continuous moment to which anyone can relate. The hope is that visual art paired with sound will slow down and then heighten sensory experience to allow the audience to focus on a few simple representations of the human condition.

Chester uses archival material as the warp and woof of art designed to reflect and then redirect an intercultural gaze. Some might argue that because this expression ventures into the socio-political realm, and given that original material has been (quite literally) warped and made into performance art, the composition belongs in an exhibition or museum, and no longer in the archive. However, consider Diane Taylor's description in her book, *The Archive and the Repertoire*, of a rift between archival memory ("items supposedly resistant to change") and repertoire, which "enacts embodied memory-performances, gestures, orality, movement, dance, singing-in short, all those acts usually thought of as ephemeral, non-reproducible knowledge."[113] A repertoire is intangible, unlike a solid object that can be read in or of a particular time and place. A repertoire suggests a collection that can be transferred over time and space. In fact the transference of knowledge is the concern here, as it pertains to the living and changing culture of local and global communities. As humans, we are bent on building silos of knowledge and expertise, categories and classifications that can

113 Diana Taylor, *The Archive and the Repertoire: Performing Cultural Memory in the Americas* (Duke University Press, 2003), 19.

lead to hierarchical power structures. Archival material, catalogued and classified, maintains a semblance of pure form. Taylor writes,

> What changes over time is the value, relevance, or meaning of the archive, how the items it contains get interpreted, even embodied. Bones might remain the same while their story may change-depending on the paleontologist or forensic anthropologist who examines them. Antigone might be performed in multiple ways, while the unchanging text assures a stable signifier. Written texts allow scholars to trace literary traditions, sources and influences. Insofar as it constitutes materials that seem to endure, the archive exceeds the 'live.'[114]

Archives are created when objects or texts are deemed important to preserve for a particular community. Storing and restoring these artifacts is integral to keeping cultural memory or the impact of an historical event alive. The only thing that keeps the past alive in the present moment is its importance to the community and the way in which it can haunt the present. In effect the past needs to serve as a living shadow of the present.

Art has unique power to inspire universal and powerful modes of expression. By using archival materials, artists can play important roles not only in preserving, recording, and archiving sensitive cultural artifacts, but also in creating new compositions that perpetuate cultural practices by giving them a continuous present in today's rapidly shifting, cosmopolitan, and virtual world. Professional artists can be commissioned to create compositions, which have their own place in the archive alongside the source material. These compositions can also instigate community art projects that promote awareness about the past—and where appropriate—can even be used to pave the way for healing and reconciliation. Taylor describes the positive impact on communities when "people participate in the production and reproduction of knowledge by 'being there,' being a part of the transmission."[115] Connecting members of the community with the material of archives through artistic initiatives helps preserve ephemeral material by revitalizing its relevance and place in a current context and allowing them to perform as artists and interpreters as they compose personal and temporal perspectives about the archival material in and of their generations.

Form-Shifting

Stalla and Chester are developing a particular creative methodology called "form-shifting" that might be useful for archivists who are interested in considering practice-based community arts projects as one way of transferring knowledge.

They have designed workshops in which participants are invited to work with a core original text. Participants recreate the artifact by closely observing its form and structure, its bones so to speak, and using these elements, transform the original piece into a new piece of creative work in mediums or forms that speak best to the participants. So far, in addition to the Theyyam archival field recordings, they have used material ranging from digitized tape collections from Jordan and Oman in the 1980s to mid 20th Century artifacts and photographs from the Arabian Peninsula, to early drafts and manuscripts of published texts by modernist writers such as Gertrude Stein and Virginia Woolf. This process can create art work that is private or meant for wider viewing; either way subsequent group conversations about the process and the range of interpretations allow for unique moments of discovery and connection with the past. Filtering the bones of archival material through artistic mediums creates a bridge between the past and present that doesn't necessarily exist through heritage or national identity.

114 Ibid.
115 Ibid., 20.

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THE SOUND ARCHIVE AT SCHOOL: A PROJECT TO PREVENT VIOLENCE IN EARLY CHILDHOOD EDUCATION

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1. Sound and listening

Recorded sound is a base of information and knowledge, the testimony of persons and societies; an intangible memory that will show future generations what we are. Throughout history, the sounds people hear have changed causing societies to chang their listening habits.

From the perspective of sound, the pre-industrial society was characterized mainly by human and natural sounds, while the industrial society was characterized by the sounds of technology and the emergence of noise. In the post-industrial society natural and human sounds have moved to second and third level to give prominence to those sounds generated by technology.

About 150 years ago, it became possible to record sound. Since then there has been continous developments in sound recording and reproduction equipment. These developments have provided improvements in the quality of reproduction, surround sound, and portable equipment. This has changed the habits of listening. One of these new habits is the act of listening at high volume levels. This is part of a common problem of industrialized societies: noise.

Recent research has studied the relationship between high levels of sound, which is considered noise, and violence as social expression. "Acoustic violence is an expression of modern society — a lack of solidarity and respect towards fellow human beings and to the environmental habitat."[116] Pilar Lago has said, "Acoustic violence is a new form of social violence."[117] Violence levels are increased in noisy spaces — spaces in which communication is nearly impossible. For example, massive spectacles that utilize loudspeakers, music at high volumes, and fireworks affect people who are powerless against such aggression. Transit for a long time in a traffic environment can cause aggressive behavior by drivers.

Noise pollution can cause anxiety, stress, nervousness, nausea, headache, emotional instability, tendency to argue, sexual impotence, mood changes, increased social conflict, neurosis, hysteria, and psychosis.[118] Also prolonged exposure to noise can affect health, interfere with communication, and affect memory and learning.[119] Furthermore, long exposure to unwanted sounds can cause a distortion of sound aesthetic appreciation, leading to the acceptance of general industrial sounds as normal, for example, the sound of cars, which often leads to a counter-perception that natural sound environments are unhealthy. With these loud noises in our industrial and post-industrial landscape — listening to the television at high volumes, speaking loudly, listening to very loud music — we isolate ourselves. We become noise producers, unconsciously contributing to the generation of spaces characterized by noise pollution, which generates a form of violence: acoustic violence. Acoustic violence — intense noise that affects our health — is just one form of violence through sound.[120] At this point, what can we do as sound archivists and documentalists to counter acoustic violence?

116 ASOLOFAL. III Jornadas Internacionales Multidisdiplinarias sobre violencia acústica, *Asociación de Logopedia, Foniatría y Audiología del Litoral*. Rosario, Argentina, 2000.
117 Lago Castro, Pilar: La contaminación sonora: una nueva forma de violencia social. Universidad Nacional de Educación a Distancia. Faculta de Educación. España, 2003.
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2. Prevention as an option

Every society attempts to stop and to prevent violence. One prevention project took place in Mexico last year with the project Sounds in the Classroom, a prevention program of social violence in early childhood education sponsored by the National Sound Archive, CONACULTA, and the Health Ministry of México. The project ran from March 2013 through November 2013. The idea was to explore the impact of noise in the classroom as a form of acoustic violence and to explore the use of sound archives in the classroom as education support for children.

The proposal began by taking into consideration the sounds humans experience during their first contact with the world. As humans, we begin to recognize sounds in the 24th week of gestation.[121] If sound is one of the first forms of interaction with the world around us, the sense of hearing must be important in the early years of life. As humans, we have an innate musical sense linked to our sense of hearing. We have the capacity to listen and understand rhythmical patterns from an early age.

Music is an artistic creation and expression of societies. People often join together to play music and to listen to music in rituals, parties, and festivals — their daily existence is accompanied with music. Music is an expression of individual and collective emotions. Also music is a form of communication and interaction with children. In fact, lullabies are sung in many cultures of the world; they are thought to be universal.[122] Lullabies can transmit emotional information and establish strong links between mother and baby. Lullabies are often more effective at reducing stress in children than words.[123] Children can recognize music from different backgrounds because they are able to recognize unfamiliar sounds. As children develop, education, culture, and society often play roles expanding or restricting this capacity.

The sound imagination begins forming in the early years of life with the voices, sounds, soundscapes, and music that a child hears. From the first year of life, children interact synchronously with music and express themselves with sounds. For example, a baby listening to music can move or react as sound stimuli are heard. The ability to perceive and understand music comes without instructions — our abilities are innate. Researchers[124] agree that music could be anterior to language.[125] In fact, our ability to speak is a result of a previous ability to perceive, understand, and produce musical sounds. Speech is a form of music.[126]

Music education must take into consideration that children learn as scientists, experimenting, creating, and exploring.[127] Working with music in the early developmental years of children contributes to their ability to develop capabilities mentioned above. Furthermore, music education contributes to the development of higher sensitivity (human and aesthetic) and self-confidence. Schafer suggests music education should be developed in three areas: a) Encourage children's creative potential to make their own music; b) Introduce students to the sounds of the environment; and c) Discover a nexus or meeting place where all the arts can meet and develop together harmoniously.[128]

121 Gómez, Ulises Reyes, Martha Patricia Hernández Rico, Diana Reyes Hernández, and Lidia Javier. "La música de Mozart en el periodo prenatal." *Ginecol Obstet Mex* 74 (2006): 424-8.
122 Trehub, Sandra. "Los bebes comprenden la música." Interview by Eduard Punset en *Radio Televisión Española*. Abril 2013. Available in: http://www.rtve.es/television/20130415/bebes-comprenden-musica/640260.shtml (Diciembre, 2014).
123 Trehub, Sandra. Op. Cit.
124 Ibid.
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126 Anzieu, D. El yo-piel. Biblioteca Nueva, Madrid, 1987.
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One way to familiarize children with music is to use the music preserved in the vaults of sound archives. If children listen from the early months of their life to classical music, folk and traditional music, children's stories, poetry, literature, and soundscapes (among other recordings from our archives), their lives will be enriched.

3. Music at school in México

In this sense, during 2013, a multidisciplinary group of professors and researchers developed the project Sounds in the Classroom, a prevention program of social violence in early childhood education. The first stage was sponsored by the National Sound Archive, CONACULTA, and the Health Ministry of México. The project was developed in a kindergarten, located in an economically depressed area with high rates of violence in Mexico City. The kindergarten enrolls 164 children, whose ages range from two months to six years old. These 164 children are organized into 12 groups: four infant groups, two maternal groups, and six pre-school groups. The children attend school Monday through Friday, between six and twelve hours each day. Thus, kindergarten is a space in which children may stay for up to 50% of each day.

The reasons mothers and fathers need to leave their children at school for such a long duration are usually economic. These parents often take on very long commutes in order to earn enough money to support the family.

If these children remain for so many hours each day in kindergarten, the soundscape there becomes a key factor in their development. Unfortunately, the kindergarten where this project was applied is a noisy space. It exceeds the 35 decibels recommended by the World Health Organization (WHO), and reaches in some areas 80 or 100 decibels. Noise is a serious problem in this school. Noise affects cognitive processes; it is responsible for some of the major health risks of teaching.[129] "The lack of acoustic comfort in classrooms, occasioned by the soundproofing of the spaces and the background noise of students affect school performance: more than 40 dB impede the activities of calculation, at 55 dB memory processes are affected, at 70 dB reading comprehension problems appear. These same reasons are responsible for one of the main teacher´s health risks in Latin America related to diseases of the throat, such as pain, dryness, dysphonia, nodules, and ulcers. It is related to chronic fatigue, stress, and diseases of the throat and vocal cords."[130]

Noise is also negatively associated with discipline. The presence of noise in the classroom and teachers' efforts, often useless, to control it by raising their voices, make the school a sort of battlefield and create hostile environments for all with adverse conditions for learning.[131] Noise is an element of the noise pollution that is present in the classroom and, therefore, contributes to the generation of acoustic violence in school.

Therefore, the first phase of Sounds in the Classroom was to make a selection of 450 sound documents that children could hear during their stay in kindergarten. The selection included classical music, popular music (songs and nursery rhymes), traditional Mexican music, world music, literature, and historical sounds. These sound documents were to be used as support in educational tasks, to enrich humanistic and artistic education, and as elements to enrich the soundscape of the school. In this first phase, copies of the materials were on CD because the school does not have computers in the classrooms. To protect copyright the CDs were limited to use at the school and it was prohibited to make copies.

129 Echeverría, Belem. Niveles de ruido contaminante en primarias de México, por encima de los límites de la OMS. Entrevista en *Quadratín*. México, 2014. Available in: http://www.quadratin.com.mx/educativas/Ruido-un-contaminante-en-las-escuelas-primarias/.

130 Dominguez, Ana L. Violencia acústica y cuerpo social. El ruido en las ciudades latinoamericanas. *GT26 Sociología del cuerpo y de las emociones* . Chile. 2010.

131 Domínguez, Ana Lidia. Violencia acústica en la escuela. En Sonidos en el Aula. Programa de Prevención Social de la Violencia en la Educación Inicial. México, 2013.

Each document was accompanied by a listening guide, recording data, and recommendations for use, according to the areas of knowledge and the age of the children. The listening guide includes: name of the disc and the piece, author, appropriate grade level, suggested activities for use of the sound recording in the classroom, formative areas of knowledge, skills, expected learning outcomes, and cataloging data.

Below is an example listening guide:

SONIDOS EN EL AULA
MÚSICA POPULAR
GUÍA DE ESCUCHA

CANTOS Y RONDAS INFANTILES
Disco: Violoncello de Colores 1
Título: Naranjas y limas
Autor: Pilar Gadea
Grupos escolares: Grupos de lactantes, maternal y preescolar.
Guía y referencias para la escucha: Esta obra es una canción tradicional para niños que puede ser utilizada para aproximar a los niños a la música y en especial al disfrute sonoro del violoncello.

Lactantes:
Ámbito 1. Vínculo e interacciones
Identifica sus emociones, sentimientos y necesidades.
Identifica intereses y gustos-

Ámbito 2. Descrubrimiento del mundo
Disfruta compartir historias, canciones, rimas y juegos.
Experimenta con los sonidos.

Ámbito 3. Salud y bienestar
Avanza en el desarrollo de su bienestar emocional.
Expresa emociones y necesidades.
Maternal y lactantes

Campo formativo:
Expresión y apreciación artística.
Expresión y apreciación musical.
Competencia: Expresa su sensibilidad, imaginación e inventa al interretar o crear canciones y melodías.
Aprendizajes esperados:
Sigue el ritmo de canciones utilizando las palmas, los pies o instrumentos musicales.
Inventa historias a partir de una melodía escuchada.SONIDOS EN EL AULA

FICHA CATALOGRÁFICA
Título del soporte: Violoncello de Colores 1. Método de iniciación a la música para niños
Título de la obra seleccionada: Naranjas y limas
Productor: CONACULTA
Intérpretes: Bozena Slawinska, violoncello; Carlos López, piano; Marlén González, arpa y
Ángel Álvarez; Guitarra.
Año: 2012
Lugar: México
Temas: Cantos y rondas infantiles, música para niños, violoncello.

For teachers this selection was an invitation to use the sound documents as a tool in the classroom and to explore their possibilities in the classroom. It was also a way to access a diversity of music that was not otherwise available to the teachers.

As part of the project, workshops were prepared for teachers, parents, and workers. The courses covered sound education, acoustic ecology, noise and violence, music in the classroom, and the sound archives at the school. Through the workshops, teachers, workers and parents became aware of the importance of sound in their lives, how noise is a harmful agent that causes noise violence and how the sound document is a fundamental tool in teaching. As a result of this project, teachers developed actions to reduce the noise levels in their classrooms.

For example, this school used loudspeakers to communicate messages to teachers and to call the children when their parents came to get them. After the Sounds in the Classroom project, the teachers realized that this communication system constantly interrupted attention in class, distracted children, and generated noise. Therefore, they decided to eliminate this communication system.

The teachers began to take the children on sound walks, an activity they learned during the workshop. The sound walk is an activity in which students walk in silence in order to hear and identify sounds in the environment. The teachers noted that after the children began to engage in sound walks, the noise level decreased and school children learned to listen and the noises children produced in the classroom decreased. During this first phase of Sounds in the Classroom, the study group began to realize the potential of sound education, acoustic ecology, and of the use of sound archives in the classroom as a method to mitigate acoustic violence and to enrich the education of children.

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RESEARCH ON THE PRODUCTION OF CZECH SOUND RECORDINGS TO 1946 FOCUSING ON THE GRAMOPHONE COMPANY ESTA[132]

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1. Abstract

The study brings the partial results of the research undertaken within the framework of the project Internal Grants of the Faculty of Arts of Charles University. The research deals with the Czech production of sound recordings and it is focused on the gramophone record company ESTA up to 1946 in Czechoslovakia. A brief summary of the evolution of gramophone records is followed by an introduction of the first Czechoslovak gramophone company ESTA and its production. Methodologically, the study relies on a physical survey of the phonograph records in selected collections in our country and abroad and on the historical bibliographic records or databases of selected institutions in the Czech Republic. The aim of the research is to collect bibliographic information about the production of gramophone records in our territory to 1946 and, in cooperation with the Moravian Library in Brno, finally to make the data gradually accessible in the Virtual National Phonotheque database.

Keywords: sound recording, gramophone company ESTA, study, databases, bibliographic data

2. Introduction

Internal grants of The Faculty of Arts of Charles University enable the emergence of interesting projects in the field with the possibility of scientific activities which would under normal conditions hardly occur. Support and motivation for students is through this grant very welcome and implements realization of previously approved projects. In cooperation with the Director of the Institute of Information Studies and Librarianship, PhDr. Barbora Drobíková, Ph.D., we prepared a project named "Research on the Production of Czech Sound Recordings to 1946 Focusing on the Gramophone Company ESTA" at the end of 2013. The project was successfully approved.

The decision to start with this project was to a large extent influenced by my participation in the projects closely related to the issue of gramophone records. Fortunately, I had an opportunity to address these issues through my work experience in the Moravian Library in Brno. In the first place, I need to say that this topic is nowadays very neglected, almost forgotten. Given that audio recordings have been with us already for more than 130 years, we also need to consider that this medium was used during the 19th and 20th century to preserve the memories of the nation. Therefore, we are talking about documents that are as important as printed documents, i.e., an indispensable value for some professionals. An important part of a country's cultural heritage is formed by a comprehensive database of discography records covering all commercially published audio documents related to that country. This has not been established in any form, and thus we are losing all the important, interesting and rare records from the 19th and 20th century forever. In many countries of the world, an exhaustive discography of audio recordings has already been published, including the history and development of the sound recording industry companies in the countries concerned. However, when we focus on a specific part of the audio documents (recordings published in the first half of the 20th century on the territory of Czechoslovakia), we encounter no such thing as databases by distinguished foreign publishers mentioned above.

Because of this situation, it was our intention to select the first Czechoslovak record label ESTA, which operated on the territory of Czechoslovakia from 1930 until 1946. As there is

132 This article was originally published in ProInflow journal: peer-reviewed journal focused on the field of information sciences, 1/2014. http://pro.inflow.cz

no discography processed into any form of a comprehensive database, we decided to create it. It is needless to say that the work could not be carried out without the surveys in memory institutions. Furthermore, there is also the need of other research of the old reservation catalogues and the necessary assembling of the data found in the form of bibliographic records, and it is clear that it would not be possible to complete this work without the help of private collectors and colleagues from the field, but most importantly, without the assistance of the various institutions. Building a database of this historically important gramophone company (including contents of the recordings, artists, and artistic value) allows us to preserve this cultural heritage for the next generations.

3. The Information Research

There were many collectors in Czechoslovakia and in the Czech Republic during the 20th century. Unfortunately, they were the only professionals and experts early in the history of the gramophone records in our country and, as time passed, any efforts to handle this issue vanished. There are only a handful of those who are dealing with this issue today. We can find very little information about the period of time before 1946 in public resources. Since the largest part of the discography was carried in the catalogues of the gramophone company, it was not preserved given its status of the so-called grey literature. There can be found two documents[133] (catalogues) in the Union Catalogue of the Czech Republic which contain records of published albums by Czechoslovak brands Esta, Ultraphon, and Supraphon from 1930 until 1945.[134] Unfortunately, we have found that they are incomplete; with entire series, catalogue, and matrix numbers missing. Further inquiry revealed that the documents have been modified in accordance with the ideology of the time (e.g., missing classics of the Czech music scene and forbidden authors).

Mr. Gabriel Gössel is a private collector who studies and deals with the issues of the gramophone industry in Czechoslovakia. His two books on the history of sound recording represent the most complete work covering the beginnings of the gramophone industry in the 19th and 20th century on our territory.[135] The first time we encounter a more comprehensive text about the history of the ESTA company is in the publication "Fonogram 2 - Výlety k počátkům historie záznamu zvuku."[136] The text is focused on the beginnings of this company and then introduces us to the production and promoting of famous artists. It also helps us to understand the marking system used for discs, i.e. the catalogue numbers located on the labels. A very important part of this publication is the dating of Czech repertoire recordings based on the catalogue numbers of the disc, which became a central element of the survey itself.

Regarding the terms of searching the databases of selected institutions during the initial survey, we have found only 70,000 records in the Union Catalogue of the Czech Republic. The oldest of the audio documents, a vinyl record, comes from the collections of the Central Library of the Faculty of Arts of the Masaryk University and was published in 1952.[137] Nevertheless, searching the catalogue of the National Library of the Czech Republic returns no records ear-

133 *Československá hudba na gramofonových deskách: Ultraphon, Esta, Supraphon*. Vyd. 1. Praha: Gramofonové závody, 1947. 61 s.

134 *Celkový katalog gramofonových desek: Supraphon, Ultraphon, Esta*. V Praze: Gramofonové závody, 1948. 1 sv. (přeruš. str.).

135 GÖSSEL, Gabriel. *Fonogram. Praktický průvodce historií záznamu zvuku*. 1. vyd. V Praze: Radioservis, 2001. 229 s. ISBN 80-86212-19-X.

136 GÖSSEL, Gabriel. *Fonogram. 2, Výlety k počátkům historie záznamu zvuku*. 1. vyd. Praha: Radioservis, 2006. 536 s. ISBN 80-86212-44-0.

137 *NKC: Online katalog Národní knihovny České republiky* [online databáze]. Praha: Národní knihovna České republiky, 2009- . Dostupná z: http://aleph.nkp.cz/F/DRP95MP9R68B2RGRUNT23PH2JMG8J8SX3R8YD83KRJ528DVC1H-36161?func=file&file_name=find-b&local_base=NKC

lier than 1981.[138] When searching the catalogue of the Czech Museum of Music, we got the total number of 3,379 sound recordings published from 1900 to the present time. Unfortunately, records containing only the information about the title, artist, and the call number are not sufficient.[139] The total number from the online catalogue also does not match the total number of audio documents found in the archives of the Museum — there are tens of thousands of copies. Therefore, we needed to visit the catalogues in person.

4. History of the Gramophone Company ESTA

There were two companies in the early 1930s in Czechoslovakia, which successfully created a market for various genres and different approaches to music. This state of affairs lasted for a long time until 1946. These companies became the pride of the Czechoslovak gramophone industry and in a very strong competitive struggle with other labels were able to work together. The first one was Ultraphon and the second one was ESTA — the first purely Czechoslovak record label in our territory.

The first company in Czechoslovakia to establish a production of gramophone records was mentioned in the press in the mid-1930s. It should be Foresta, a company engaged in the lumber trade. Apparently, a part of the name Foresta was used for the newly formed records company and the image of a flying heron was added as a label symbol.[140]

It is noteworthy that the company issued flexible celluloid records back in the 1930s. According to some sources, there were more than 220 records under the catalogue numbers 100–213. There were also reprints from matrixes of the German record labels Kalliope, Artiphon, and Vox. The repertoire was the so-called "swept shelves"; thus recordings were a vast medley ranging from Hebrew via US opera to dance orchestras and Czech folk. However, it also contained some rare Czech recordings of the famous R. A. Dvorský. Nonetheless, they fell out of fashion very quickly and at the end of 1931 the company decided to switch to the classic shellac records. As a matter of fact, there was no other option because shellac became the standard for most of the European as well as worldwide production.[141]

When browsing historical catalogues, we can see that the composition of the repertoire until 1939 was focused mostly on folklore. What is very interesting is the gradual acquisition of funding based on publishing of customized advertising records. One of the examples is the contract with "Československá obec sokolská [Czechoslovak gymnastics organization Sokol]". Under the contract, production of vinyl records that musically accompanied physical exercises performed at "IX. všesokolský slet [9th Sokol gathering]" was commissioned. These records can be found on matrix numbers 2617–2629.

The quality of the recordings was comparable to recordings made by publishers worldwide and at the beginning of the German occupation emphasis was placed on recording of classical music, especially by Czech composers, which was also emphasized in the export to Poland, Hungary, Bulgaria, or Austria. After World War II started, the record label ESTA faced a common problem with the lack of high-quality materials for manufacture. Germany was, among other things, cut off from the sources of shellac, which was a valuable and necessary raw material for the production of gramophone records. Especially in the years 1940–1942 ESTA's records of popular music very often suffered from poor quality, when the recording itself

138 *SKC: Souborný katalog České republiky (CASLIN)* [online databáze]. Praha: Národní knihovna České republiky, 2009- . Dostupná z: http://aleph.nkp.cz/F/GSKUBINV1597AV99AEC4P8PIUIQRQRHASM1FK6EPJJBG2CJ1FL-03030?func=file&file_name=find-b&local_base=SKC

139 *České muzeum hudby on-line katalog* [online databáze]. Praha: Národní muzem. České muzeum hudby, [2014-] . Dostupná z: http://opac.nm.cz:8080/opaccmh/

140 Gramotechnika: první oficielní odborný list Svazu pro průmysl a obchod s gramofony v ČSR. Praha: Svaz průmyslu a obchodu gramofony, hudebními nástroji a jich příslušenstvím, 1929-1935.

141 Až kometa šlehne nás: z historie zvukového záznamu. Praha: Galery, 2003. 91 s. ISBN 80-86010-70-8.

was overwhelmed by the noise of the groove. It is worth mentioning that the company was involved in the recording and publishing of the speeches of the Reich Minister of Propaganda, Joseph Goebbels.

At the beginning of 1943 ESTA expanded from publishing to holding festivals, concerts, cabarets and at the same time was given authorisation to "… manufacture tools or equipment or medium to communicate, transfer, oscillate, or reproduce sound or image, especially gramophone discs, gramophones, gramophone parts, gramophone matrixes, radio, television, photograph or film parts, amplifiers, as well as organize concerts, festivals, license or carry out in commercial or business activities in the context of social purposes."[142]

When the war was over, a new label with the Made in Czechoslovakia sign was added and ESTA quickly forgot about its former relationships with the Nazis, while forming strong attachments with the new establishment. Sound recordings of marches Moskva [Moscow] (matrix number 4859) and more than thirty pieces by Ukrajinský sbor písní a tanců [Ukrainian Group of Songs and Dances] (matrix numbers 4867–4900) were made already in May 1945.
The colourful history of the gramophone industry in Czechoslovakia after World War II saw a whole series of measures whose ultimate goal was to bring this politically important industry under the control of the state, or, more precisely, under the control of the Ministry of Information that was controlled by the Communists since 1945. The Czechoslovak music industry was nationalized on the basis of Decree No. 100 (that is, one of the so-called Beneš decrees) dated 24 October 1945. The administration of nationalized enterprises was put in the hands of their interim manager. Nationalized assets included all assets of companies that were on the territory of Czechoslovakia and participated in the production of vinyl records before 9 May 1945, hence the company ESTA, s. r. o., Prague, Holečkova XIV., was pursuant to Decree No. 922 of 1946 part of it.[143]

5. Label Catalogue and Matrix Number

A very important part of a recording, in our case a shellac one, is the label in the form of a paper circle in the middle of the disc, which is located on each side of it. The label has been until present used as a carrier for the communication of many important pieces of information: bibliographic data and unique identifiers. Each side of the disc contains a recording or more of them (the number depends on the size of the disc and also on the length of the recording), and each recording is connected to the name listed on the label attached. It also contains the name of the publishing label (or company), the names of the performers, the data about the speed of playback, and last but not least, the unique identifiers in the form of two numbers. Every record label has such identifiers that can distinguish between the different discs, different tracks recorded in different years or between individual companies. These identifiers are represented in the form of a number series with the addition of a letter and can be found on the paper label. These are also engraved or stamped on the inner side of the disc. It is all about the matrix number and ordering or catalogue number. Matrix numbers are always bound to the original medium, which is on the matrix plate. These numbers are located on the paper label and depicted on the inner side of the disc This number gives information about the audio recording on the given side of the disc, so two different matrix numbers can be found on one disc The catalogue numbers, on the other hand, are bound to the given recording while serving as an identifier for the entire disc. Each of these unique number identifiers is important and has its place on the label on the disc and outside, too.

142 Náš gramofon: zprávy o deskách Esta-Siemens-Polydor-Brunswick. Praha: Esta, 1942-1944.
143 GÖSSEL, Gabriel. *Fonogram. 2, Výlety k počátkům historie záznamu zvuku*. 1. vyd. Praha: Radioservis, 2006. 536 s. ISBN 80-86212-44-0.

6. ESTA Catalogues and Discs

The only way of getting information about the gramophone records issued at the beginning of the 1930s were record company's catalogues. Every business wanting to have new records in their stores got their hands on these catalogues first, and so did the vendors that offered discs throughout the country and abroad. To give an example, we would like to present here one of the first ESTA catalogues. This catalogue covers the production from January to September 1931. In the course of the year, there were so-called additions published almost every month. These included a selection of records by various artists guided by the company's policy. As we can see in the attached catalogue (fig. 1), all the information needed can be gained from it: all the artists, musical accompaniment and names of the songs or recordings. It may be noticed that two gramophone record names come under a single catalogue number. Indeed, we are still in the 1930s and the shellac discs, having the gauge of 25 cm, managed to carry only the maximum of 3 minutes of sound.

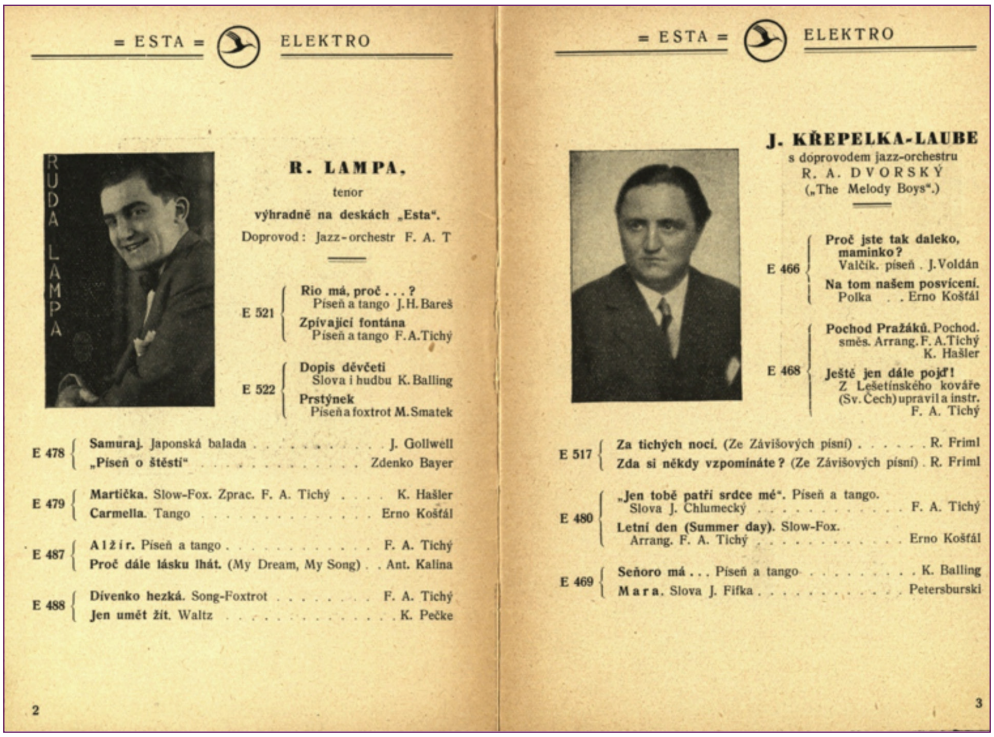

Figure 1. ESTA catalogue from 1931.

Unfortunately, we are not able to get the matrix number from the catalogue itself. This number is always different for each recording and it is located in two spots at one side of the disc: stamped on the inner side and printed on the label of the recording. The next figure shows clearly the layout of all the important bibliographic information of the recordings. Each label contains the name of the company (the ESTA logo in our case). We can also see the basic information about the name of the recording: title, author or artists. The last two entries collected are the matrix and the catalogue numbers. In order to avoid possible mistakes while cataloguing numbers, we always follow "the golden rule" of the method of elimination (i.e., if we have a number stamped on the inner side of the vinyl, approximately in the first centimetre from the edge of the paper label, we can find this number on the label as well; we then know exactly what the matrix number is and the other one is thus always the catalogue number.

Figure 2. Label on a gramophone recording by ESTA.

One of the goals of our project is to get all the information right at all times. That is why we use the catalogues and shellac discs labels mentioned above.

7. How to Obtain Information

There are several ways that we use in our effort to obtain all the necessary information in order to complete the data sheets of discography of the ESTA record label and all have contributed to the results of this study. All of them have become an important part of the whole project in its own way. Without the help, willingness, and cooperation of private collectors the most important parts of this study could never be accomplished. First and foremost, we are trying to obtain information from ESTA catalogues. Such catalogues existed in different forms — from a simple sheet of paper listing a few of the most popular songs up to the carefully equipped coloured publication in hard cover. Unfortunately, these documents are not available in the collections of any of the devoted institutions, let alone digitally. The only way to gain the information is to visit private collectors who own these catalogues and who allow us to study their materials.

The most important part is to get the information about issued gramophone records and the repertoire based on them. The same was needed by the customers once the first companies started to market these records at the time. According to history, these catalogues of sound recordings already existed at a time when the music industry was still at the very beginning. The first catalogue of gramophone records was released around 1892 by the London based company Parkins and Gotto. This company was also engaged in the import business with the first Berliner's gramophones and gramophone records — more than 28 years before the first catalogues of the Czechoslovak company ESTA were published. It was necessary for every

record company to publish catalogues of their recordings if they wanted to stay on the market at the beginning of the 20th century.[144]

Due to the fact that there is no comprehensive database aimed at the activities of the ESTA company (Czech Republic has no union catalogue for audio documents), these records have to be searched for in different historical institutions. It is a serious problem since even if there are some records in an institution's collections, they are to a large extent not listed in the institution's catalogues, or the institution is not even aware of their existence. Therefore, it is necessary to visit such institutions, locate and study the records on site. In this lengthy process, we went through the selected libraries and, unfortunately, we must conclude that we are not able to go through all of the selected collections in a reasonable time frame. Among the most important institutions that we have visited we can name the National Library of the Czech Republic, the National Museum, Czech Museum of Music, and specifically the Náprstek Museum, the Moravian Library in Brno, private archive of the Supraphon company, Archive of the Czech Radio, and music library of Univerzitná knižnica in Bratislava.

8. Making It Accessible

The Virtual National Phonoteque of the Czech Republic has been selected for making the collected bibliographic data accessible. It is a database which serves to gain information about the existence of, storing, and medium of audio documents in selected institutions and outside them. The portal aims to fill a gap in understanding our national cultural heritage. Prior to the start of this project there was no comprehensive source of information on sound heritage — there was no discography listing all relevant recordings (those published on the territory of the Czech Republic, or published abroad but relevant to the national cultural heritage), as well as no comprehensive catalogue of sound documents held by institutions in Czech territory. Thanks to the portal, we are now able to leverage other institutions to catalogue their collections of old recordings and provide their metadata records to the portal.

9. The Portal Software

The Virtual National Phonotheque Portal is based on VuFind open source library resource portal software. VuFind is developed and maintained by Villanova University's Falvey Memorial Library with contributors from many other institutions including the Moravian Library. VuFind utilizes Apache Solr to provide search functionality with faceted results, "More Like This" suggestions, display of deduplicated results and much more. Individual institutions can provide their metadata records via OAI-PMH or through metadata exports in MARC21 (preferred) or other formats. To manage the imported datasets and deduplicate the records the Moravian Library uses Record Manager, VuFind add-on developed by the National Library of Finland.

10. Digitizing

We have gathered a general overview of the audio recordings with an ESTA label in the course of the exploration carried out in memory institutions' collections. Having consulted the matter with experts in musicology and an agreement with private collectors held afterwards, we came to the conclusion that another result of our study should be a platform allowing users to listen to selected recordings. In our case this meant making a selection of an adequate number of commercially issued records (which are not available on any of the new audio media) and completing digitization in cooperation with private collectors and the Moravian Library in Brno (esp. with the help of the digitization department).

Based on new digitization standards proposed by the National Library of the Czech Republic, the Moravian Library prepared an extension of the digitization metadata standards to cover

144 GÖSSEL, Gabriel. *Fonogram. 2, Výlety k počátkům historie záznamu zvuku.* 1. vyd. Praha: Radioservis, 2006. 536 s. ISBN 80-86212-44-0.

digitized sound. It has also produced a gramophone record digitization recommendation describing the whole sound digitization workflow from selection to access and long term preservation, which has been certified by the Ministry of Culture earlier this year (2014). This means a great opportunity to process selected gramophone records in high quality a make them accessible in a digital library. Czech legislation allows libraries to digitize sound documents under the condition that the library has a physical copy in their archive.[145] To conform to this requirement, the Moravian Library has developed a software extension of Kramerius 4 (open source digital library system) to support access to audio documents. However, libraries need to take into account the copyright law and its interpretation of the property rights pursuant to Section 27 (the duration of property rights), which stipulates that, unless otherwise provided, the property rights remain protected for the life of the author and 70 years after his death.[146] Therefore, if the recording is still protected by copyright law, the digital copy is accessible on site (in the library building) only. The library also does not allow the user to download a copy of the recording.

11. Summary

Gramophone records have been present for more than 110 years in our territory. They were the driving force at the time of the First Republic and during the second half of the 20th century became one of the most popular medium for music in the world. Despite the fact that these records where coming to the end of their life, people managed to rescue many of the records and at the present time the Czech Republic has once again become one of the most important producers of these sound recordings.

However, the attitude towards the documentation of audio documents in recent years does not correspond with this position. These sound records suffer from lack of interest; existing information is not easy to access in comprehensive databases and memory institutions themselves sometimes do not even know that something like this is present in their collections.

Our aim is to arouse interest, whether of individuals or institutions, and to attempt joint projects aimed at safeguarding and rescuing cultural heritage by preserving an image, or rather the sound, of the past.

This research is only the first step in an effort to begin to address these issues on a larger scale. However, we must not forget particularly about the actual physical condition of those carriers that we have seen during our visits in memory institutions. The problem is to be addressed by the Ministry of Culture, by adapting its view of the cultural heritage embodied in audio documents. Following the example of collegial institutions, e.g., the British Library, we need to establish a network of people who come from different institutions, study different disciplines, and are interested in this subject. Then, we need to begin to work on the issues. To start with, we could try to create a group of experts under the auspices of the National Phonotheque.

The opportunity to work with experts and especially benefit from cooperation with the private collectors was the cornerstone of our work throughout the project. Gradually, we managed to assemble complete, mainly corrected discography data of the ESTA record label. Unfortunately, we found out that physical carriers themselves are almost certainly not present in memory institutions located in the Czech Republic. This work, this survey enabled us to gather the necessary information and contacts. We will try to continue working on a general catalogue of Czech recordings in the future. All these steps should lead to increasing support and interest in our cultural heritage.

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