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**45TH ANNUAL CONFERENCE OF THE INTERNATIONAL  
ASSOCIATION OF SOUND AND AUDIOVISUAL ARCHIVES (IASA)**

**Connecting Cultures: Content, Context, and Collaboration**

**Cape Town, South Africa  
5 – 9 October 2014**

This year's conference, *Connecting Cultures: Content, Context, and Collaboration*, promises to be an inspiring and exciting event informed by the diverse natural and cultural landscape of South Africa and the Southern African region. With your participation in this auspicious event, we will indeed connect cultures and open many new ways for collaboration to ensure the safeguarding of our valuable sound and audiovisual heritage.

This year's exploration of time-based media heritage issues is hosted in the mother city of South Africa, Cape Town. The city is named the *World Design Capital for 2014* by the International Council of Societies of Industrial Design and is set at the foot of one of the world's most renowned landmarks, Table Mountain, recognized as one of the New 7 Wonders of Nature in 2011. Not only will we be in one of the most beautiful and diverse places on earth, we'll also be in the heart of multicultural literacy and publication—the National Library of South Africa's Center for the Book—our venue for the conference.

It will be our pleasure to welcome you to Cape Town from 5-9 October 2014 for a week of discussions, debates, and sharing of ideas with local and international experts on matters of sound and audiovisual archives.

Come to connect, collaborate, and explore; and while you're here, enjoy the warm South African hospitality and the rich culture and beauty of Cape Town!

Please find all conference information on the conference website at <http://2014.iasa-web.org>

For any further information or questions please contact the Organizing Committee and the conference administrator through [enquiries@iasa-conference.com](mailto:enquiries@iasa-conference.com).

**International Association of Sound  
and Audiovisual Archives**



**Internationale Vereinigung der  
Schall- und audiovisuellen Archive**



**Association Internationale d'Archives  
Sonores et Audiovisuelles**



**Asociación Internacional de Archivos  
Sonoros y Audiovisuales**



Recently I have been in conversations with colleagues from small and medium archives in the US where the term “post-digitization” has been in focus. What does it mean to be in a state of post-digitization? In these conversations, post-digitization is the state of being that follows after an archive has met the rush to digitize its holdings, has established the sustainability of its digital assets at least at the bit-level, and has created descriptive access points and mechanisms for access to the content. In this state of being, an audiovisual archive has accomplished the goals that have been set in place over the past decades—assess, describe, digitize, store, preserve, make available. Post-digitization is the activity of questioning, What happens next? What are the next steps for an archive as they look to the future? This is a question that some organizations have the privilege to begin considering now—organizations that began their digitization journey in the early years of this century.

The future is long. If an archive follows best practices towards sustainable digital preservation of its collections, of course one might expect that the archive will commit to a continual future of obsolescence monitoring (ensuring that formats are accessible and migrating to new formats when at risk), fixity monitoring (verifying that unintended changes to the files in the archive are not occurring and taking action when changes are identified), technology refreshing (updating digital storage technologies as older technologies begin to fail or become obsolete), and, of course, continuous ingest of new digital content into the archive in consistent and manageable ways. But digital preservation is only one piece of the puzzle; continuous access into the future is another topic altogether. I have noticed over the past few years a serious gap in our discourse about the future of audiovisual collections: what are the protocols for keeping pace with the rapidly changing technologies that constitute the surface of the internet? What are we doing to maintain relevance through access?

The Internet, in many ways, has become the intended future location of the Reading Room. We talk about digitization as an opportunity; it is because we see an opportunity for access via the Internet. In some ways, the semantic web is an answer to the question I pose; but it is not the complete answer. Yes, the post-digitization future is about improved interoperability of data online. The persistence of the connections that we create between collections on the internet is of immense importance. An element of post-digitization will be to join in the development of this larger network of connected knowledge. For many people, however, that is an abstract goal because the technologies that support such infrastructure seem to change at a rapid rate. The technologies that constitute the ecology of the internet—markup languages, coding languages, abstracted database layers, operating systems, digital asset management systems, application programming interfaces—advance at such speed that post-digitization archives wonder how they will ever keep up. How will they keep from becoming obsolete themselves? The plight of post-digitization archives is to stay relevant in the information society by ensuring consistent technological upgrades to their new reading rooms in order to continue providing quality access, upgrades which invariably relate to their institutional web presence. My colleague, Ed Summers at the Library of Congress, recently spoke to the National Digital Forum in Wellington, New Zealand and stressed that “if you are not providing meaningful access in the present to digital content, then you are not preserving it.”<sup>1</sup>

Of course it is a luxury to have this problem already in 2015 as we look down the barrel of a loaded gun called technological obsolescence. For the majority of audiovisual archives across the globe the issue is not one of web technologies—the issue is ultimately a race to digitize the international audiovisual record before it becomes impossible or unaffordable to do so. But today and for the next fifteen years the greatest challenge facing sound and audiovisual collections globally is not exactly format obsolescence and degradation. For now, at a broad level, the field has determined, with fairly unanimous agreement, the best methods and strategies to overcome obsolescence. Caring for physical collections is understood and well-documented.

1 Ed Summers, “The Web as a Preservation Medium,” keynote delivered at the National Digital Forum, Wellington, New Zealand, November 27, 2013. Accessed at: <http://inkdroid.org/journal/2013/11/26/the-web-as-a-preservation-medium/>

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Digitization practices are mature and an entire industry now offers both boutique and high-throughput digitization services for the cultural heritage community. Learning from banks and the information-heavy corporations of the world, archives are equipped with the necessary role models for building, staffing, and sustaining digital repositories worthy of carrying our sound and audiovisual heritage into the future, that is, until we meet our next technological shift. Today, as a community, we are not burdened with the ignorance of how we should proceed or what we should do to save our collections. Today, one of our greatest challenges is determining how we are going to afford to do what we know we need to do to save our vanishing recordings and how we can communicate those needs into arguments that compel people—funders, stakeholders, ourselves, and our colleagues—to act. Funding for digitization, funding for building the necessary digital infrastructure to secure the outcomes of digitization (in addition to the born-digital sound and audiovisual heritage being acquired now and into the future), and the arguments to compel action—these are real obstacles.

The field is in need of tools that help quantify the problems we face and that translate the needs of audiovisual preservation into the rhetoric of business analysis. Administrators, executives, and potential funders need economic arguments surrounding audiovisual preservation that demonstrate why the money must be allocated for digitization and digital preservation and why inaction will result in real financial loss. The opening two articles in this issue of the IASA journal address this issue head on. Chris Lacinak, of AVPreserve in the US, introduces a new tool and a new framework to support convincing funders and administrators that the cost of digitization is of real value to the organization. “The Cost of Inaction” is Lacinak’s answer to a common financial phrase, Return on Investment, and Lacinak offers a new free online tool that can be used to generate graphs and statistics to articulate an organization’s potential loss of investment if digitization is not undertaken. Marcos Sueiro Bal, Senior Archivist at New York Public Radio, brings a theoretical framework to this conversation that uses three factors—signal-to-noise ratio, cost of extraction, and time—to offer logical evidence that “delaying signal extraction amounts to a less effective use of resources.” Together, these two opening articles empower us to advance our arguments for funding for digitization and to ensure the preservation of the international audiovisual record.

In relation to my earlier argument about post-digitization, Guy Maréchal, of the non-profit organization TITAN in Belgium, offers an article in this issue that places the concept of semantic technologies in the context of IASA. Maréchal’s text is a call for further awareness of web technologies and for an adoption of their use by audiovisual archives. IASA has an opportunity to set the foundation for audiovisual archives worldwide, and Maréchal suggests that IASA is entering a third phase of its existence—one where we have already completed the activities of identifying methods for digitization, physical care, cataloging, ethical use of collections, managing digital formats, and storage; one where we can now focus on setting guidelines for semantic interoperability of objects, subjects, and their relationships.

Description is not always for open access, though. As we know, we need various forms of descriptive and technical information to manage collections internally on a day-to-day basis. At the University of Illinois at Urbana-Champaign in the US, John Gough and Myung-Ja K. Han recently completed an effort to define a campus-wide protocol of required and optional metadata elements that can be used to consistently document audiovisual holdings of the University for preservation. Gough and Han also offer an overview of useful tools for automated metadata extraction to support efficient generation of metadata for large quantities of audiovisual content.

As I so strongly wrote above that we have little further to learn about digital preservation, I must admit that I am aware that I am necessarily exaggerating for effect, because we all know that we never quite know everything about anything. Daniel Teruggi and Luca Bagnoli of the Presto4U project remind us that there is still much work to be done in the audiovisual digital preservation domain, especially with regard to recordings created in music production environments. The “Music and Sound Archives Community of Practice” of the Presto4U project is very interested in working closely with music archives directly related to production because

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the content of these archives “present a general preservation problem due to the complexity of the production environment and the economical implications this may have for their activity.” Teruggi and Bagnoli report that action is being taken to propose solutions to this issue and that we can expect findings to be presented at conferences this year.

From opposite ends of the globe, this issue of the IASA journal brings forward two articles that discuss a post-custodial effort to open the archive to new agents and to new content, focusing on sensitivity and control. At Universiti Putra Malaysia (UPM), the Audiovisual Research Collection for Performing Arts (ARCPA) team—Ahmad Faudzi Musib, Gisa Jänichen, and Chinthaka Prageeth Meddegoda—discuss the experience of building a music archive in an environment where many colleagues had to be convinced of the value of preserving and providing access to sound recordings. At UPM, the ARCPA team brought collectors into the archive and allowed collectors to describe their own collections, removing the control of description from the hands of archivists and librarians. Most importantly, the ARCPA team reminds us that ethical treatment of performers in description is of continued importance, and that it is imperative that archival principles be integrated in as equal a way as library information has been integrated into undergraduate and graduate studies of tertiary educational institutions in order to ensure a future appreciation of the importance of archives.

Meanwhile, at the University of Washington, in Seattle, Washington in the US, John Vallier is opening the academic library to born-digital Rock and Roll and grappling with the revolutionary act of being an archivist who is bringing alternative music into the forefront of library and archive collections while simultaneously struggling to comprehend the revolt of the fans who want unfettered, unchained access to the content. See how things turn out in Vallier’s engaging article in this issue.

Wrapping up this issue is an overview by JA Pryse of the Oklahoma Historical Society of contemporary efforts to reach out to the community through the development of a crowd-sourced description program. The Clara Luper Pilot Program proved to be “an inexpensive and effective manner to provide detailed and accurate data for user retrievability.” Pryse’s text offers a potential model for efficient and cost-effective description using community resources.

As is apparent through the texts in this issue, the IASA community is alive with activity, building tools and frameworks to invite greater funding of our collections, standardizing our descriptive practices for internal preservation and access and for external interoperability, continuing to identify at-risk content for digital preservation, opening the doors of the archives to new collections and new users, and strengthening connections between the archive and its communities. The next issue of the journal, issue 44, will likely cover highlights of this year’s annual conference in Cape Town, South Africa. However, I invite you also to think about my proposition that we are nearing a new phase of the audiovisual archive within the next 10-15 years: the post-digitization phase. When your archive has met the goals of stabilization, digitization, and preservation, what will be the next set of goals? In what areas should we begin to focus, and how will we get there? The deadline for submissions is 31 October 2014. Please consider sharing your work or your research with the IASA community. All are welcome to submit proposals to this, your IASA journal.

I look forward to seeing you in Cape Town in October.

*Bertram Lyons*  
Editor, IASA

Dear IASA friends and colleagues,

It's something of a surprise to come to the end of my three-year term as president of the IASA. The time has gone very quickly, probably because this was a period of great busyness for our organisation (though what term hasn't been just as busy?), but also because working with a committed Executive Board has been a great pleasure. However the beginning and end of the cycle of our organisation are great points for reflection, a place to consider what has been achieved, and a chance to deliberate on what this can lead to.

Each executive board is a link in a continuous chain of our organisation. The previous board put in motion a set of major changes allowing our organization to move forward and adjust to a changing world and the changing role of our organisation within it—updating the constitution and launching the incorporation process being the key part—all achieved with the steady support from IASA's members. This established a trajectory for the then new board, and a set of challenges to be met. At the beginning of my presidency I called for a period of consolidation, a time to allow the board to carry through the tasks associated with those changes and to enable them to take root and become a foundation for new growth within IASA.

Incorporation was a significant aspiration for us. Incorporation gives us the legal status to work with government and non-government organisations, and to be able to undertake transactions within those partnerships. The new constitution implemented previously was driven by a need to take this step, and its form enabled it. Incorporation is now complete. However, the final stages of incorporation required us to tweak the wording of the Constitution to comply with the legal necessities of our constitutional host country. To achieve this we initiated the first electronic ballot of our organisation: it was a resounding success. The changes were passed unanimously, but more importantly we had a very high rate of participation in what was arguably a minor issue. The fact that we are able to undertake such an electronic ballot adds strength to our international status as an organisation, as it allows all our members to participate. A big thanks goes to the board for making this happen, particularly Bruce Gordon, Richard Ranft, and our new Treasurer, Tommy Sjørberg, who brought together the necessary technology and information to make this work.

That we have a new Treasurer is itself a source of satisfaction, and a great achievement. The financial responsibilities of our organisation are complex, and becoming more so as we try to achieve more with the funds we create. Part of the consolidation work of this board has been to establish a new financial management regime, and to try to minimise the complexity that banking across national borders creates for an organisation such as ourselves. Tommy has shouldered that burden, and has agreed to stand for the next board as well in that role. The other official change in the board during its term was the addition of Bertram Lyons to our numbers in the role of editor. He has made a great contribution to our organisation, and I would like to thank him for all his hard work and patience.

Which brings me to the election. This is an exciting election for IASA, it is the first of our electronic ballots to elect a new board, and if the participation rates in the constitutional change are kept up, I can see this really reflecting the views of our members; I encourage and implore you to consider carefully your choice in what is truly an impressive array of talent, and to cast your vote. All ballots must be cast on or before September 6th, 2014. Details can be found on the IASA website: [www.iasa-web.org/election-2014](http://www.iasa-web.org/election-2014). This election shows the gifted depth of our organisation, and the willingness to shoulder the workload to the good of IASA. Thank you to all who are standing, every one of you would make excellent members of our Executive Board, and I'm sure all of you will contribute to IASA regardless of the outcome.

The shape of IASA's membership is changing as the world's financial and political conditions are tightening the belt of many of our member institutions. In fact the number of institutional members is falling, while the number of individual members is increasing. This is a reflection not only of the financial state of the member institutions, but the increasing mobility of the

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membership within those institutions. However it does have an impact on the finances of IASA, as it reduces the flow of income, and this will be a matter for the next board to consider. The good news, however, is that the number of members is still increasing.

Our upcoming conference is in South Africa. It has been a decade since we were in Pretoria and it is with a sense of pleasant anticipation that we look forward to revisiting that country, this time in beautiful Cape Town. The theme is perfect for such a vibrant and multifaceted society: Connecting Cultures: Content, Context, and Collaboration (the five C's, as we call it). It will be held in the National Library of South Africa's Center for the Book, a delightfully appropriate venue. The conference looks to be a great event, containing a lot of significant and important papers, along with plenty of opportunity for discussion and debate. In addition, the local team has put together a great selection of post-conference tours for those who choose to combine the conference with some holidays. "C" you there!

At the end of my tenure as president, I would assess that this period of consolidation has been a success—we have now a solid foundation upon which to base a new growth and continued adaptation. At our next annual general meeting in Cape Town, I become the Past President on the IASA executive board, a position that provides stability in transition. I look forward to working towards the new aims of the new board.

*Sound regards,  
Jacqueline von Arb  
President*



**DAVID G. LANCE**

April 14 2014, former IASA President David Lance passed away in Canberra, Australia in the presence of his partner Lorraine Thomson, his two sons Bill and Andy, and their mother, Kay Chee.

David was Keeper of the Department of Sound Records of the Imperial War Museum in London when some of us met him for the first time at an Oral History Conference in Leicester in 1972. In the UK he was one of the pioneers of oral historical research which became part of the efforts of several IASA member archives throughout the world. David's project of interviewing survivors from the Battle of Jutland (1916) was remarkable. It made clear the suffering and endurance of those common seamen who play so little role in official war histories. His interviews with war survivors can still be heard in the sound archives of the Imperial War Museum.

In IASA David's role soon took another turn. In 1975 in Montreal he was elected Secretary General of the Association, succeeding Rolf Schuursma in that function. Indeed, after the first six years of getting things off the ground IASA was ready for the more professional approach of the three 'angry young men': the new President Dietrich Schüller, Treasurer Léo LaClare and David Lance. Amongst many other things David was active in building a network of National Branches that soon became one of the pillars of the organization. After serving six years as secretary he was elected as IASA's fifth President. In 1984 in Como, Italy, David ended his outstanding career in the Association moving his field of action to the Far East in 1979, where he was instrumental in setting up the Oral History Unit in the National Archives of Singapore. The program recorded interviews with Singaporeans who had memories of significant historical events and included information from a large spectrum of Singaporean society.

In the mid-1980s, David and his family moved to Canberra, Australia, where he became the Curator of Audio-visual records at the Australian War Memorial, moving on to the Assistant Directorship. His last professional position was as Manager of Policy Development at the Museum of Australia.

After his retirement, David pursued many volunteer roles, such as working with the Red Cross, Lifeline (a telephone counseling service for people with emotional problems), and broadcasting for Print Handicapped Radio. He became involved with the local Quaker community. Throughout his life, he maintained friendships with his IASA colleagues, and many of us will remember him as a truly great President of the Association. Vale, David.

*Rolf Schuursma and Grace Koch*

*Image: Reception to mark the departure of the Keeper of the Department of Sound Records, Mr David Lance, 29 July 1983. Mr David Lance with the clock presented to him by the Museum. (Photo courtesy and copyright of the Imperial War Museum, London, England. Image ID: IWM/83/31/12.)*

## THE COST OF INACTION: A NEW MODEL AND APPLICATION FOR QUANTIFYING THE FINANCIAL AND INTELLECTUAL IMPLICATIONS OF DECISIONS REGARDING DIGITIZATION OF PHYSICAL AUDIOVISUAL MEDIA HOLDINGS

Chris Lacinak, AVPreserve, USA

*Special thanks to Michael Casey of Indiana University for his many contributions to the evolving thoughts behind this work as well as some of the content of this article. Special thanks also to Richard Wright whose work and correspondence helped spark the concept behind this effort.*

### 1. Introduction

The paragraphs that follow tell the story of Anon University, a hypothetical university representing a conglomeration of organizations with holdings of legacy physical audiovisual media. This is done in order to provide a realistic look into a universal conundrum that poses a serious threat to the future value derived from content stored on physical audiovisual legacy media. While the subject of this story is a university, this conundrum is not specific to academic institutions. It manifests in organizations of all types and sizes, including government institutions, corporations, non-profits, museums, media companies, and more. Some of the arguments and positioning differ based on organization size and type, but the core concepts and calculations are the same.

### 2. Setting the Stage

The Archives and Special Collections within Anon University (ASCAU) estimate that they hold about 100,000 rare or unique audio and video items which would be deemed preservation-worthy but that have not yet been digitized. Less than 3% of their total AV holdings have been digitized to date. ASCAU's non-digitized holdings are effectively inaccessible in any meaningful way because they are largely undescribed and unplayable in their current state. Their backlog of unprocessed materials represent approximately 50% of the total holdings. For these materials there are minimal, collection-level descriptions and most of them do not contain inventories. For the 50% of processed AV collections there is no item-level description. Adding to the backlog, acquisitions far outpace the rate of preservation and the budget for acquisitions is larger than the budget for preservation.

As this type of scenario commonly plays out, there are few requests for access to materials because there is very little information that is discoverable about audiovisual content in the holdings. When requests do come in, each one becomes an immediate preservation project that moves to the front of the prioritization queue, because in almost all cases they are unable to fulfill a request without digitizing materials. There is no ability to play back most of the materials and it is against policy to play back original recordings for access even in cases where they do have the equipment and expertise.

The backlogs and limited description leave the employees of ASCAU to depend on varying levels of descriptive annotations (with varying levels of dependability) scribbled on boxes and labels to discern whether or not a particular item is likely enough to be the subject of the patron's request to deem it worthy of using a portion of the small on-demand digitization budget reserved for such purposes. Once this decision is made it could take weeks to receive the access copy. It is not until this point, when the content is actually accessible, that the patron is able to establish whether or not it is indeed related to what they were searching for. While it is easy to bemoan the expectations of a culture that demands instant access and expects everything to be online, it is also the case that the scenario described here would not be deemed as effective or meaningful access by most people. Additionally, access requests are the number one driver of digitization, but the lack of discoverability in the collections means there are far fewer requests for access to materials than are expected.

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When such requests for access are received, the materials generally must be outsourced to a digitization vendor unless the formats meet the capabilities of the Library's services. At Anon University Library there is a small digitization facility for audiocassettes and VHS tapes within the Preservation Department, but there is no permanent staff for digitization, and finding the expertise and funding to do training with graduate students on a regular basis is challenging and often expensive due to the inefficiencies of frequent turnover and re-training.

There is no programmatic ongoing digitization effort. Most digitization has been funded through grants, although these tend to be focused on access-centric projects such as online exhibitions where only small portions of the budgets go towards digitization.

### 3. A Shift

In 2013, List-Serv messages, blog posts, and conference presentations began to catch the eye of multiple stakeholders in the Archives and Preservation Departments. The initial post was from Richard Wright on the Association of Moving Image Archivists (AMIA) List-Serv in which he stated:

*"For video the problem is even sharper: complete disappearance of an (affordable) ability to transfer."*<sup>1</sup>

The thought of this possibility caused great alarm, and they searched for additional information to support his claim. They found on the Presto Centre blog a couple of additional statements from Wright on the topic:

*"75% of the analogue video held in Europe in 2006 will be lost by 2023 when video digitisation will simply have "ceased to be."*<sup>2</sup>

*"So that's it: going, going, gone for analogue by 2023"*<sup>3</sup>

This spawned further research where they discovered the following statements:

- The IASA Task Force to Establish Selection Criteria from 2003 reported, "in the mid-to long-term there is a major risk that carrier degradation combined with playback obsolescence will defeat the efforts of archivists." A decade had passed, making them concerned about where they were on the timeline.<sup>4</sup>
- The United States' National Recording Preservation Board report on "Capturing Analog Sound for Digital Preservation" from 2006 reported "it is alarming to realize that nearly all recorded sound is in peril of disappearing or becoming inaccessible within a few generations."<sup>5</sup>
- The United States' National Recording Preservation Plan Sound Study published in late 2012 reported that "many analog audio recordings must be digitized within the next 15 to 20 years—before sound carrier degradation and the challenges of acquiring and maintaining playback equipment make the success of these efforts too expensive or unattainable." They also noted that while this was published in late 2012, it was years

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1 Wright, Richard. <preservation.guide@GMAIL.COM> "Re: Storing 16mm Full-Coat Mag." 17 February 2013. <[amia-1@sv.uky.edu](mailto:amia-1@sv.uky.edu)> (31 May 2014).

2 Wright, Richard. PrestoCentre Answers: "Digital master archive format" 5 February 2013. <<https://www.prestocentre.org/answers/tv-radio-and-new-media-broadcasting/digital-master-archive-format>> (31 May 2014).

3 Wright, Richard. (2013). "Going, Going, Gone: prospects for analogue audiovisual content." PrestoCentre Blog. <<https://www.prestocentre.org/blog/going-going-gone-prospects-analogue-audiovisual-content>> (31 May 2014).

4 "International Association of Sound and Audiovisual Archives Task Force to establish Selection Criteria." (2003) Introduction. <<http://www.iasa-web.org/task-force/2-introduction>> (31 May 2014).

5 "Capturing Analog Sound for Digital Preservation: Report of a Roundtable Discussion of Best Practices for Transferring Analog Discs and Tapes." (2006), v. <<http://www.clir.org/pubs/reports/pub137/pub137.pdf>> (31 May 2014).

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in the making going back to 2009, leaving them wondering whether 15–20 years was more like 10–15 years now.<sup>6</sup>

Prompted by their growing concern they looked to organizations such as the International Association of Audiovisual Archivists (IASA), the Association for Recorded Sound Collections (ARSC), and the Association of Moving Image Archivists (AMIA) to confer with colleagues. Among experts they found consensus around the prediction that between now and some time between 2023 and 2028 analog materials would become inaccessible.

With their newfound knowledge they formed a Working Group within the University, pulling together stakeholders including archivists, preservation experts, researchers, faculty, and IT to focus on the issues surrounding preservation and access of the AV holdings.

Inigorated, they prepared a bold statement for the upper administration laying out the information about the estimated size of their holdings and the timeline in which they have to act. They also took the opportunity to express the troubled state of access to their AV holdings, proposing it as a warning of what could become permanent if action was not taken. Their main focus points were:

- The great cultural significance of the collections, highlighting particularly valuable content and examples of how it was used in important work.
- The valuable public relations and reputation building that stem from acquisitions and holdings.
- The potential damage to their good reputation by falling short on their obligation to preserve and make accessible their recordings.
- The potential damage suffered to their good reputation if the significant highlighted materials were permanently lost while in their care.
- The potential perception of irresponsibility implied in acquisitions that outpace and demand greater budgets than preservation and access.
- The potential failure to fulfill their mission to provide access to faculty, students, researchers and the public.
- A call to action to identify, prioritize, and digitize the priority materials before 2028.

The upper administration took the statement to heart and charged the Working Group with quantifying the problem and putting together a budget and timeline for getting this work done. The administration provided them with a modest budget in order to conduct a survey of holdings and to report on the findings along with an estimated budget and timeline.

Feeling the wind at their back, the Working Group got to work and over the course of the next several months conducted a survey of holdings which they used to generate a plan for digitization. Based on their findings they estimated that approximately 65% of the undigitized holdings would ultimately be deemed worthy of digitization and preservation, totaling approximately 63,050 items, made up of 60% audio and 40% video.

Exploring the economics of digitization they discovered that the cost of outsourcing preservation reformatting had decreased approximately 70% on average in the past 5 years. In other words, what would have cost \$150 in 2009 costs \$45 in 2013. This provided an impetus to outsource a majority of the work, although they also identified that there were certain materials that they would want to digitize in-house. Concerned about keeping the budget as low as possible in order to increase the likelihood of funding, they decided to focus on doing the minimum necessary to ensure the materials were not lost. Items could be cataloged and made accessible in all kinds of ways after 2028, but only if they were digitized prior to that. In order to maintain the option to do anything with the content after 2028 they needed to digitize it.

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6 "The Library of Congress National Recording Preservation Plan" (2012), 7.  
<<http://www.clir.org/pubs/reports/pub137/pub137.pdf>> (31 May 2014).

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After 2028 there was no option available—the content would be permanently lost. With this in mind they decided to capture a minimal amount of metadata, focusing on information that they would not be able to capture later as well as any metadata required to be able to responsibly manage the collection of files. They also recognized that they needed to have a reasonably robust centralized digital storage environment. The risk of storing all of the digitized files on unreliable and/or non-centralized storage would be too great.

After a great deal of analysis and planning, their total budget estimate to digitize and store everything by 2028 was \$9,305,311. This was a sizable number that worried the Working Group, but they found confidence in their strong arguments, solid planning, and well reasoned budgeting. It was also not an unprecedented number for other types of projects considered a University-wide priority, particularly given that the budget was allocated over the course of 15 years. They would also argue that the University's continued acquisition of materials over the coming years would be well served by this same infrastructure.

In addition to delivering the report, the Working Group gave a presentation on their proposed plan to upper administration. Despite what were eye-popping numbers at first glance, they entered the meeting with a good deal of hope based on their previous success in garnering support and great enthusiasm about the importance of the project.

During the presentation the upper administration was outwardly stunned by the dollar amount. Questions were asked about whether or not all of the “priority” materials were truly preservation worthy, and whether or not the Working Group could get the digitization done more cheaply with student labor. The conversation turned to thoughts of monetization and revenue streams, wondering aloud about everything from licensing content as a way to generate revenue to having vendors digitize the content for free in exchange for offering the firm exclusive licensing.

Diplomatically, the Working Group reminded the administration of the complex issues of rights and donor agreements and the challenges that these presented in regard to licensing content. They also raised concerns in a nuanced way about the innate contrast between their mission of providing access and placing the keys to the content solely in the hands of a commercial interest. The administration then turned to thoughts of Anon University being a service provider to other institutions as a way to generate revenue. They asked the Working Group about the feasibility of this, to which the Working Group replied that it was a possibility but that it would take more staff and an increase in annual throughput in order to get their own work done in addition to doing work for others. The budget would have to go up significantly to accommodate these increases, and they admitted that they felt unsure about it as a strategy for recouping any costs beyond those of acting as a service provider.

Frustrated at the seeming lack of good options, the administration brought the meeting to a close, conveying that the bottom line was that it would be irresponsible of them to expend those funds without a plan for return on investment (ROI). It was a non-starter without a plan for ROI. They asked the Working Group to come up with thoughts on ways to generate revenue and at minimum recoup their investment in the digitization project.

#### **4. An Impasse**

The impasse represented in this scenario is one that has presented itself for decades. Archivists and caretakers of collections have been frustrated by what is perceived as shortsighted thinking; and executives and administrators have been frustrated by a perceived inability to face the economic realities. This disconnect has persisted over time with each “side” digging their heels in further.

As a community, archivists and caretakers have fallen back on arguments centered on potential loss of intellect and culture, as well as damage to reputation and failure to fulfill institutional missions. While executives and administrators care a great deal about these arguments, at the

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end of the day they are staring at a budget for which they are responsible that does not care for non-quantifiable arguments. In rare cases when compelling arguments based on reputation, mission, and the currency of intellect and culture have fallen on the right ears at the right time, they have translated into currency that will fund initiatives. In most cases these arguments alone are not effective in capturing the understanding and wallets of funders.

There is a critical component that is often overlooked in these exchanges and the thinking that surrounds them. This is the Cost of Inaction, or COI. Let us examine what this looks like in the case of Anon University.

## 5. A New Perspective – The Cost of Inaction

At the next Working Group meeting a realization materialized. The Archives and Special Collections at Anon University were established in 1963, 50 years prior to 2013. Their discussions with the administration had treated this effort as if the investments in their holdings would begin with digitization. They had failed to recognize the investment made in these collections going back to 1963.

The Archives and Special Collections were founded with the deposit and acquisition of a large collection containing approximately 20,000 audiovisual items. Between 1963 and 2013 they acquired 80,000 additional audiovisual items. Since 1963, the University had invested in staff, real estate, construction, utilities, specialized temperature and humidity controls, management, administration, moves, rehousing, equipment, supplies, consulting, acquisitions, and more.

The Working Group decided to estimate the past investment that the University had placed in their physical audiovisual materials. They explored various methods of deriving this number. One method involved allocating a percentage of the operational and capital budgets between 1963 and 2013 to the audiovisual holdings. Another involved estimating an average cost per item per year for each year since the Archive was established. A final involved trying to identify audiovisual specific expenses, such as specific staff or projects. The first method proved to be the most reasonable and Anon University arrived at a number of approximately \$11,000,000 that had been expended on the AV holdings to date since 1963. In addition to the current holdings, the University was acquiring an average of 1,600 items per year. At this rate of growth, if the University paid an average of \$2 per item per year (factoring in staffing, facilities, collection management, etc., over that time) the total investment on legacy physical audiovisual items between 1963 and 2028 would be approximately \$14,500,000.

Based on the consensus that reformatting will be largely impractical or impossible after 15 years, if the University took no action to digitize and provide a basic digital preservation storage environment for these items they would effectively throw that 65-year investment of \$14,500,000 out the window, having received little to no benefit given that the holdings were largely inaccessible during that time. The cost of inaction in this case would result in the loss of 124,000 items in their care *in addition to* \$14,500,000. This significant portion of the funding expended in the Archives and Special Collections would be deemed fruitless, a wasted cost.

The Working Group's prior calculations on project cost came to approximately \$148 per selected item to digitize and provide a basic digital preservation environment through 2028. Expending these funds would effectively result in the saving of this past investment, yielding a return. The \$14,500,000 invested between 1963 and 2028 in the physical audiovisual holdings is allocated over 78,650 items (65% of the 124,000 items in holdings by 2028, minus the 3,000 items digitized as of 2013). This means that the average investment would be approximately \$184 per item. For each item they spent \$148 on to digitize and store over the next fifteen years, they would recoup \$184 of past investment, yielding a return of approximately 24% through 2028. A difference of 124% compared to losing the \$184 invested in that item.

Armed with this information the Working Group went to work creating detailed financial models based on this concept and took it to the administration. They also reiterated the concerns around reputation and mission. This time, while the budgets of the administration had not changed and they wanted to dive into details of the financial analysis, they ultimately agreed in concept that the fiscally responsible thing to do was to avoid throwing decades of investment out the window. However the administration wanted options and asked the Working Group to come up with three scenarios representing digitization of 100%, 50%, and 25% of the current estimated 63,050 items and to report on the implications of each. They asked them not to consider the growth of the archive and to assume investment would be limited to 63,050 items through 2028.

The Working Group performed the requested analysis, providing scenarios for digitizing the current preservation worthy items, and offered the following summary:

|                         | <b>100% Digitized</b> | <b>50% Digitized</b> | <b>25% Digitized</b> |
|-------------------------|-----------------------|----------------------|----------------------|
| <b>Budget</b>           | \$9,305,311           | \$5,586,361          | \$2,826,959          |
| <b>Content Lost</b>     | 0                     | 31,525               | 47,287               |
| <b>Investment Lost</b>  | \$0                   | \$6,256,797          | \$9,510,880          |
| <b>Investment Saved</b> | \$12,765,400          | \$6,508,603          | \$3,254,520          |

They provided this information to the administration along with supporting arguments regarding the positive and negative intellectual and reputation implications of each scenario.

Armed with a more robust argument the administration was inspired to reach out to the President and the Board to seek funding for an initiative to digitize their priority holdings.

Although their goal for funding was the original \$9,305,311, the funding commitment they received was for \$650,000 per year for 5 years starting in 2014 with consideration for a funding commitment past the initial 5 years in 2018.

### **The Cost of Inaction Calculator**

Although this is a hypothetical story, it is clear that incorporating the COI model and analyses into the decision making process around digitization of legacy physical audiovisual media helps organizations understand the implications and make well-informed decisions. Providing objective financial metrics and quantifying the loss of media and content help make the case for taking more immediate action, helping to avoid a paralyzing all-or-nothing mindset by enabling insights into the choices available.

To date there has been no way for organizations to quantify the financial and intellectual cost of inaction in order to supplement traditional arguments and bridge the gaps between caretakers or archivists and executives or administrators.

AVPreserve has recently released a free and open web application named the Cost of Inaction Calculator that enables organizations to analyze and report on the implications of various scenarios representing different levels of action. The application can be found at <https://coi.avpreserve.com>.

The calculator prompts users to enter the following parameters, also shown in figure 1:

- Last year of magnetic media
- Number of objects in collection
- Collection's audio-video percentage
- Investment to date for media
- Annual cost per media item moving forward
- Digitization cost per item
- Year you will start digitizing items
- Annual digitization budget
- Storage service (dictates annual storage cost)
- Annual decrease in cost of storage
- Annual increase in cost of digitization

The screenshot shows a web application interface titled 'The Cost of Inaction Calculator'. The main heading is 'Anon University 650k details'. Below this, there are several input fields and sliders for different parameters:

- Last year for magnetic media?**: 2028 (with a slider from 2014 to 2030)
- Number of objects in collection?**: 63,050 (with a slider from 0 to 10,000,000)
- Collection's audio-video percentage?**: 40% Video / 60% Audio (with a slider from 0% to 100%)
- Investment to date for media?**: \$11,000,000 (with a slider from 0 to \$100,000,000)
- Annual cost per media item moving forward?**: \$2.00 (with a slider from \$0.01 to \$50.01)
- Digitization cost per item?**: \$60.00 (with a slider from 0 to \$100,000)
- Year you will start digitizing items?**: 2014 (with a slider from 2014 to 2030)
- Annual digitization budget?**: \$650,000 (with a slider from 0 to \$10,000,000)
- Storage service?**: Amazon (with a dropdown menu)
- Annual decrease in cost of storage?**: 15% (with a slider from 0% to 100%)
- Annual increase in cost of digitization?**: 16% (with a slider from 0% to 100%)

Figure 1: Collection parameters for entry (Anon University example).

The help menu offers information on how to interpret and adjust these parameters accordingly, as well as the assumptions behind them.

There are two sections where reporting on these parameters is provided, both in charts as well as tabular data. The first is called the Collection Analysis report, which provides results based on the collection details entered by the user as follows:

- Year
- Media
- Content Saved
- Excess Items Digitized
- Investment Made
- Content Lost
- Investment Lost
- Investment Saved
- Digitization Expense
- Storage Expense
- Digitization + Storage Expense
- Investment Saved per \$1 of Expense
- Quality of Selection

The data reported shows the cumulative progression of implications over time as seen in figures 2 and 3.

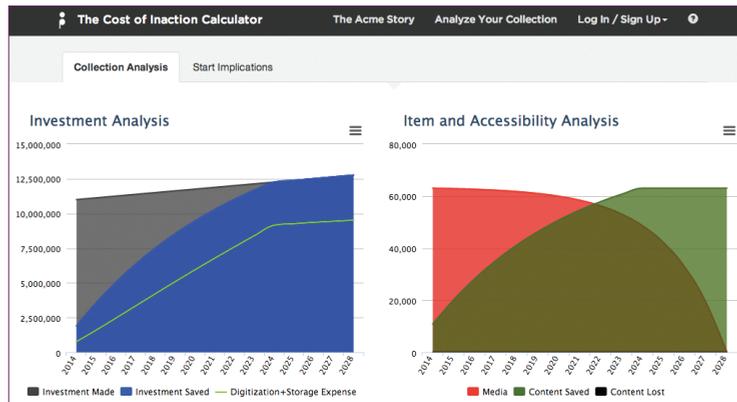


Figure 2: Collection Analysis charts.

| Year | Media  | Content Saved | Excess Items Digitized | Investment Made | Content Lost | Investment Lost | Investment Saved | Digitization Expense | Storage Expense | Digitization + Storage Expense | Investment Saved per \$1 of expense | Quality of Selection |
|------|--------|---------------|------------------------|-----------------|--------------|-----------------|------------------|----------------------|-----------------|--------------------------------|-------------------------------------|----------------------|
| 2014 | 63,050 | 10,833        | 10,659                 | \$11,000,000    | 0            | \$9,109,966     | \$1,890,034      | \$650,000            | \$115,811       | \$765,811                      | \$2.47                              | 100.00%              |
| 2015 | 62,876 | 20,172        | 9,089                  | \$11,126,100    | 0            | \$7,566,381     | \$3,559,719      | \$1,300,000          | \$299,112       | \$1,599,112                    | \$2.23                              | 99.72%               |
| 2016 | 62,825 | 28,223        | 7,891                  | \$11,252,200    | 0            | \$6,215,329     | \$5,036,871      | \$1,850,000          | \$517,101       | \$2,467,101                    | \$2.04                              | 99.33%               |
| 2017 | 62,265 | 35,164        | 6,424                  | \$11,378,300    | 0            | \$5,032,474     | \$6,345,828      | \$2,600,000          | \$747,857       | \$3,347,857                    | \$1.90                              | 98.76%               |
| 2018 | 61,749 | 41,147        | 5,241                  | \$11,504,400    | 0            | \$3,996,532     | \$7,507,868      | \$3,250,000          | \$977,573       | \$4,227,573                    | \$1.78                              | 97.94%               |
| 2019 | 61,007 | 46,305        | 4,093                  | \$11,630,500    | 0            | \$3,088,890     | \$8,541,610      | \$3,900,000          | \$1,197,212     | \$5,097,212                    | \$1.68                              | 96.76%               |
| 2020 | 59,942 | 50,751        | 2,917                  | \$11,756,600    | 0            | \$2,293,272     | \$9,463,328      | \$4,550,000          | \$1,401,832     | \$5,951,832                    | \$1.59                              | 95.07%               |
| 2021 | 58,412 | 54,584        | 1,636                  | \$11,882,700    | 0            | \$1,595,456     | \$10,287,244     | \$5,200,000          | \$1,588,896     | \$6,788,896                    | \$1.52                              | 92.64%               |
| 2022 | 56,215 | 57,889        | 150                    | \$12,008,800    | 0            | \$983,007       | \$11,025,793     | \$5,850,000          | \$1,757,526     | \$7,607,526                    | \$1.45                              | 89.16%               |
| 2023 | 53,061 | 60,738        | 0                      | \$12,134,900    | 0            | \$445,063       | \$11,689,837     | \$6,500,000          | \$1,907,915     | \$8,407,915                    | \$1.39                              | 84.16%               |
| 2024 | 48,531 | 63,050        | 0                      | \$12,261,000    | 0            | \$0             | \$12,261,000     | \$7,112,071          | \$2,040,613     | \$9,152,684                    | \$1.34                              | 76.97%               |
| 2025 | 42,025 | 63,050        | 0                      | \$12,387,100    | 0            | \$0             | \$12,387,100     | \$7,112,071          | \$2,153,405     | \$9,265,476                    | \$1.34                              | 66.65%               |
| 2026 | 32,682 | 63,050        | 0                      | \$12,513,200    | 0            | \$0             | \$12,513,200     | \$7,112,071          | \$2,249,279     | \$9,361,350                    | \$1.34                              | 51.84%               |
| 2027 | 19,266 | 63,050        | 0                      | \$12,639,300    | 0            | \$0             | \$12,639,300     | \$7,112,071          | \$2,330,772     | \$9,442,843                    | \$1.34                              | 30.56%               |
| 2028 | 0      | 63,050        | 0                      | \$12,765,400    | 0            | \$0             | \$12,765,400     | \$7,112,071          | \$2,400,041     | \$9,512,112                    | \$1.34                              | 0.00%                |

Figure 3: Collection Analysis tabular data.

The second section is called the Start Implications report and it answers four primary questions:

1. If I start digitizing in year x, how much will I need to spend per year to digitize all items that have not been permanently lost already?
2. If I start digitizing in year x, how much more money will I spend than if I start digitizing in year y?
3. If I start digitizing in year x, how much more investment will I lose than if I start digitizing in year y?
4. If I start digitizing in year x, how many more items will I lose than if I start digitizing in year y?

This report provides results based on a subset of the pertinent collection details provided by the user as follows:

- Year Digitization Started
- Annual Digitization Budget Required
- Total Spent by 2028
- Investment Lost
- Spent + Lost by 2028
- Spent + Lost Difference
- Content Lost
- % More Spent + Lost
- % More Content Lost

Figures 4 and 5 demonstrate the Start Implications reporting.

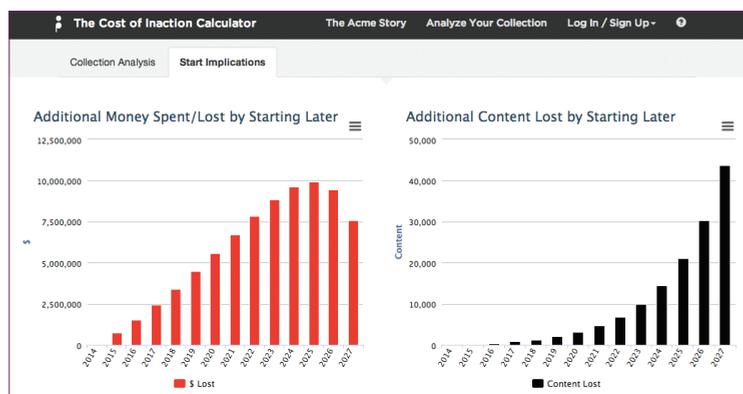


Figure 4: Start Implications charts.

| Year Digitization Started | Annual Digitization Budget Required | Storage Cost by 2028 | Total Spent by 2028 | Investment Lost by 2028 | Spent + Lost by 2028 | Spent + Lost Difference | Content Lost | % More Spent + Lost | % More Content Lost |
|---------------------------|-------------------------------------|----------------------|---------------------|-------------------------|----------------------|-------------------------|--------------|---------------------|---------------------|
| 2014                      | \$596,469                           | \$911,347            | \$9,291,913         | \$0                     | \$9,291,913          | \$0                     | 0            | 0.00%               | 0.00%               |
| 2015                      | \$706,159                           | \$765,323            | \$9,945,390         | \$35,314                | \$9,980,704          | \$718,791               | 174          | 7.76%               | 0.28%               |
| 2016                      | \$838,680                           | \$640,822            | \$10,704,782        | \$86,026                | \$10,790,808         | \$1,528,895             | 425          | 16.51%              | 0.67%               |
| 2017                      | \$999,685                           | \$533,980            | \$11,530,515        | \$158,852               | \$11,689,367         | \$2,427,454             | 785          | 29.21%              | 1.25%               |
| 2018                      | \$1,196,512                         | \$442,614            | \$12,407,734        | \$263,433               | \$12,671,167         | \$3,409,254             | 1,301        | 39.81%              | 2.06%               |
| 2019                      | \$1,438,760                         | \$364,153            | \$13,312,993        | \$413,817               | \$13,726,810         | \$4,484,697             | 2,043        | 48.20%              | 3.24%               |
| 2020                      | \$1,739,092                         | \$296,682            | \$14,209,318        | \$629,286               | \$14,838,606         | \$5,576,693             | 3,106        | 60.21%              | 4.93%               |
| 2021                      | \$2,114,342                         | \$238,195            | \$15,038,589        | \$939,002               | \$15,977,591         | \$6,715,678             | 4,638        | 72.51%              | 7.36%               |
| 2022                      | \$2,587,058                         | \$187,560            | \$15,709,908        | \$1,383,768             | \$17,093,676         | \$7,831,763             | 6,835        | 84.56%              | 10.84%              |
| 2023                      | \$3,167,652                         | \$143,504            | \$16,081,764        | \$2,022,473             | \$18,104,237         | \$8,842,324             | 9,989        | 95.47%              | 15.84%              |
| 2024                      | \$3,867,421                         | \$105,104            | \$16,934,788        | \$2,939,685             | \$19,874,473         | \$9,812,560             | 14,519       | 103.79%             | 23.03%              |
| 2025                      | \$4,692,782                         | \$71,703             | \$17,930,049        | \$4,256,646             | \$19,186,895         | \$9,924,962             | 21,025       | 107.16%             | 33.35%              |
| 2026                      | \$5,251,239                         | \$42,951             | \$12,545,429        | \$6,148,356             | \$18,693,785         | \$9,431,872             | 30,368       | 101.84%             | 48.16%              |
| 2027                      | \$7,859,818                         | \$18,874             | \$7,976,692         | \$8,864,657             | \$16,843,349         | \$7,581,436             | 43,784       | 81.86%              | 69.44%              |

Figure 5: Start Implications tabular data.

The COI Calculator allows for multiple scenarios in order to perform comparative analysis and to come to a better understanding of the implications of different decisions. It also allows exporting of the charts and tabular data as well as sharing links to scenarios. For instance, to view and explore the Anon University scenarios see the following links:

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100% scenario:

<https://coi.avpreserve.com/viewcollection/MTMzM0YIMzQwMzk0>

50% scenario:

<https://coi.avpreserve.com/viewcollection/MTMxM0YIMzQwMzk0>

25% scenario:

<https://coi.avpreserve.com/viewcollection/MTMyM0YIMzQwMzk0>

\$650k scenario:

<https://coi.avpreserve.com/viewcollection/MTMwM0YIMzQwMzk0>

## Conclusion

The Cost of Inaction has been a missing link in the discussion and analysis surrounding the funding of audiovisual digitization and preservation efforts. Recognizing and being able to articulate this concept helps bridge a gap between caretakers and administrators and offers an effective financial metric that is a meaningful addition to historical arguments based on cultural and intellectual significance. Adding this data point—COI—to ROI provides a 360 degree perspective, looking both at past investment and the return on savings of that investment with future expense, while recognizing that the window of possible return is limited based on the obsolescence and degradation of audiovisual media. There is a cost of inaction, and every organization should come to an understanding of that cost in the formation of a digitization and preservation strategy in order to help make well-informed decisions. While the scenario painted in this article focuses on a University, this rationale is just as true for all organizations holding collections of physical legacy audiovisual media. Use the Cost of Inaction Calculator to help identify what the implications are for your organization at <https://coi.avpreserve.com>.

## A THEORETICAL FRAMEWORK FOR AUDIO PRESERVATION<sup>7</sup>

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“You’ve got to help me remember”  
—The Replacements, “Never Mind”

*Abstract: Drawing parallels from the world of telecommunications, we suggest that only two factors affect the information extracted from an audio carrier: the intrinsic signal to noise ratio and the resources available for extraction. We then explore ways in which these factors vary over time, and suggest directions for future research.*

Audio archivists have two basic concerns: (a) retrieval of past audio information and (b) transmission of audio information into the future. In this respect one could say we have strong parallels with the telecommunications business, whose engineers “must develop a signal from a source and deliver it to a sink to the satisfaction of a customer.”<sup>8</sup> In our parallel world one might say we play the roles of both listener and broadcaster: listeners are concerned with retrieving a distant signal, while radio stations are interested in broadcasting a signal towards points a certain distance away. In other words, telecommunications tries to ford a spatial distance, while audio archiving attempts to do the same across a temporal distance.<sup>9</sup> In order to ford these distances, the information is encoded (modulated) in a carrier and decoded (demodulated) at the other end, and that decoded information is presented to an end user.

The present article suggests a theoretical framework for the process of extracting audio from a carrier in a preservation context, i.e., role (a) above, as presented in Fig. 1. It posits that the quality of a retrieved signal depends on only two factors: (1) its inherent quality and (2) resources available for signal extraction. Both factors vary across (3) time. Let us examine how these three factors may interact.

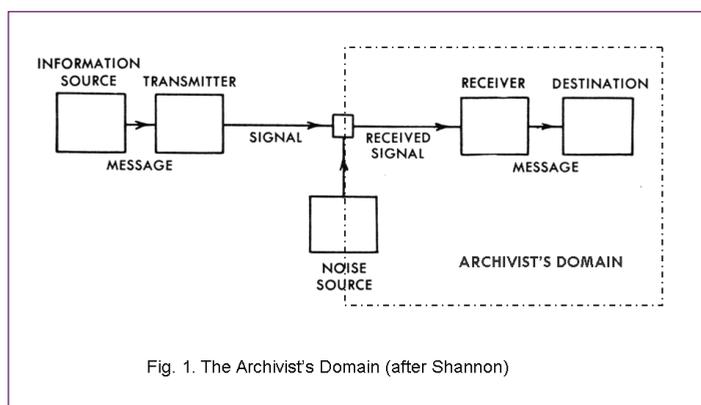


Fig. 1. The Archivist's Domain (after Shannon)

7 This article developed from a presentation at the 2012 Association for Recorded Sound Collections Conference, and I thank Mike Casey of Indiana University for inviting me to speak there. The entire article is pretty much a refinement of Fig. 1 in Richard Hess' "Tape Degradation Factors and Predicting Tape Life", Convention Paper 6970 of the Audio Engineering Society's 121st Convention (2006).

I would like to thank Andy Lanset, Director of the Archives at New York Public Radio, for generously allowing me to spend time to write this article. The staff at the New York Public Library and Dan Biddle at the Library of New York University's IFA Conservation Center were especially helpful.

8 Freeman, Roger L. *Telecommunications Transmission Handbook*. 2nd ed. New York: John Wiley & Sons, 1981, p. 1.

9 Gleick, James. *The Information: A History, A Theory, A Flood*. New York: Pantheon, 2011, pp. 8-9.

## I. Signal quality vs. time

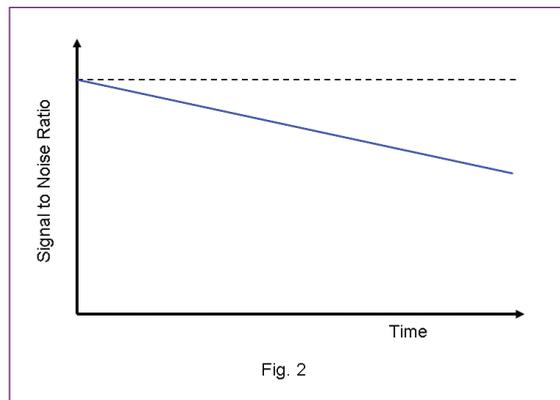
All archivists, not just audio archivists, are faced with information loss over time. This information loss is ultimately due to the change in some physical or chemical aspect of the carrier: dyes fade, paper becomes brittle, magnetism is rearranged. Moreover, over time the chance of sporadic damaging events increases.<sup>10</sup>

The combined effect of these irreversible changes is to reduce the Signal to Noise Ratio (SNR), which in a band-limited “channel” (such as an audio carrier) strongly correlates to the maximum retrievable information.<sup>11</sup> (In this context “noise” can encompass not just what we think of as traditional audio noise, but any type of distortion—in essence the reduction in likelihood of correct retrieval.<sup>12</sup>) Once information is encoded in a carrier, SNR decreases with time. Eventually, when SNR=0, the amount of available information is zero. Assuming a linear decrease, then

$$SNR(t) = SNR_0 - \alpha t \quad / \quad 0 \text{ if } H(t) > I_0 \quad [1]$$

Where

SNR(t) = Signal to noise ratio at time  $t > t_0$   
SNR<sub>0</sub> = Signal to noise ratio at the time of encoding  
 $\alpha$  = attenuation coefficient  
 $t$  = time



Calculating the attenuation coefficient  $\alpha$  would of course be useful. Telecommunications engineers routinely calculate similar coefficients (which are usually frequency- and temperature-dependent) per unit of length by comparing a signal at the start of a medium with the signal at the other end of the line.<sup>13</sup> But in this respect telecommunications engineers have two significant advantages over archivists. Firstly, they can easily measure the original signal, while archivists seldom have such a luxury: the most we can usually hope for is having reference signals of a known age, which can take such forms as test tones or error levels. Secondly, telecommunications engineers can choose well-known, homogeneous media within controlled

10 MacDonald, Lindsay, and Ralph Jacobson. “Assessing Image Quality”. In: *Digital Heritage: Applying Digital Imaging to Cultural Heritage*. Lindsay McDonald, ed. Amsterdam: Elsevier, 200, p. 353.

11 Shannon, Claude E. “A Mathematical Theory of Communication”. *Bell System Technical Journal* 27 (3): 379–423. (July–October 1948)

12 Cover, Thomas F. *Elements of Information Theory*. 2nd ed. New York: Wiley, 2006, p. 13

13 Freeman, p. 14

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environments to test, whereas the particular chemical composition and the history of a carrier or a collection are often unknown (although this uncertainty can be reduced by testing many carriers). Signals (like test tones) whose quality was registered at the time of encoding can help archivists can get a sense of signal loss by allowing them to compare the present signal with the (presumed) original; accelerated aging tests fall into this type of test. It is important to note that such coefficients do not take into account sporadic events which may further reduce the SNR. Expression [1] is thus a best-case scenario.

## 2. Signal quality vs. cost

Unlike books and still images, audio and video materials need an extra layer of decoding before they can be understood by a human user. This decoding essentially takes the form of a signal measurement using a specific device, and this adds an additional layer of complexity; in fact, the extraction point is often the weakest point in the information chain from creation to presentation.

In general, measurement tries to maximize accuracy (lack of bias) and resolution, and the latter is closely related to the signal to noise ratio.<sup>14</sup> Accuracy and resolution are affected by the quality of the measuring instrument, the skill of the operator, and the time and care spent on making the measurement. More experienced operators, better instruments, and more time spent when making a measurement will translate into higher accuracy and resolution, but also higher costs. Audio extraction operates along similar principles.

If detected, simple bias can usually be corrected exactly, but (assuming linear encoding or the entire communication channel(s)) the upper limit on SNR at time of retrieval is the SNR of the stored signal at that time: "the quality of the signal heard by the listener depends very largely on the nature of the signal present at the receiver."<sup>15</sup> We can infer that additional cost (resources) will result in improved SNR (perhaps even arbitrarily small), but the SNR will not transcend this limit. For analog sources, the upper limit is approached logarithmically, while for digital sources the upper limit can be reached.

$$SNR(c) = SNR(t) - [1/Rc] \quad [2]$$

Where

$c$  = cost

$SNR(t)$  = signal to noise ratio at time  $t$

$R$  = resource factor, expressed in dB per currency (e.g. \$)

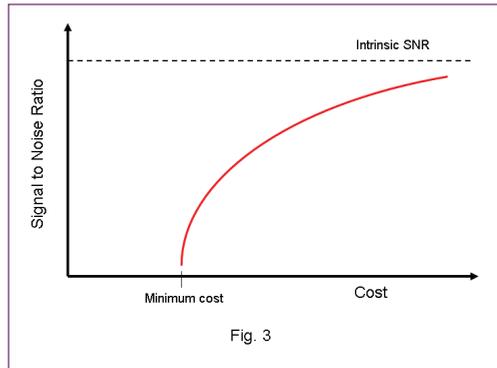
There are some potentially interesting consequences from expression [2]:

1. Since noise is additive, you should try to minimise  $1/Rc$
2. It may be useful to try to estimate the resource function  $R$ . (We again present this kind of factor as a constant for simplicity.) Given a certain machine and an operator, how many dB of SNR do you gain by spending two hours instead of one to retrieve a signal? How about if you buy a machine twice as expensive? Or an operator twice as pricey? The answers to these questions will likely vary with each specific situation.
3. There is a minimum cost of extraction below which the SNR is zero and thus no extraction can be accomplished. This seems to correlate with real-life experience.

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14 Lathi, B.P. *Modern Digital and Analog Communications Systems*. 2nd ed. Philadelphia, Pa.: Holt, Rinehart and Winston, 1989, pp.558-586.

15 Hood, John Linsley. "Tuners and Radio Receivers". *Audio & Hi-Fi Book*. 3rd ed. Ian R. Sinclair, ed. Oxford, U.K.: Newnes, 1998.



### 3. Cost vs. time

Resources available for playback over time will vary from situation to situation, but we can try estimating an average cost over time. Audio formats tend to have short periods of market dominance.<sup>16</sup> If we let  $t=0$  be the point at which a format is introduced and  $t_p$  the point in its history of peak popularity, the resources necessary to retrieve a signal with a certain resolution may generally follow a curve such as the one below, which approximates the inverse of sales of most formats. Sales of a specific format may generally mimic the general availability of resources (such as expertise or maintenance) necessary to play back that particular format. Primary markets well past their peak can become quite erratic, since monopolies and oligopolies have different incentives than competitive markets. In our case, we have estimated that after the format's peak popularity costs eventually grow almost linearly with time.

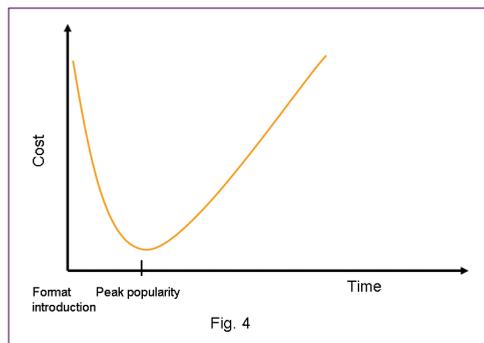
$$R(t) = R [(t^2 + t_p)/t] \quad [3]$$

Where

$R(t)$  = Cost factor at time  $t$

$R$  = Cost factor

$t$  = time



16 Franklin Templeton Investments. "Innovation Will Surprise Us... Again", in "The Case for Equities". <https://www.franklintempleton.com/funds/2020vision/innovation#.Uz7p1qLqQrc>. Retrieved April 2013.

It is interesting to note that, given a certain level of available resources, extracting the signal may become impractical in the future, as we distance ourselves from the peak of popularity for that format. This is not because the signal has intrinsically diminished in quality (although it probably also has), but rather because it is more difficult to extract. At one point, it either becomes impractical to extract the signal or you need to allocate more resources to extract it. This is the problem commonly called “format obsolescence”.

Combining all equations [1]-[3], we get the maximum SNR of a recorded signal at a specific time  $t$  with resources  $c$ :

$$SNR = SNR_0 - at - [t / (t^2 + t_p^2)]c \quad [4]$$

Where

- $SNR$  = signal to noise ratio (dB)
- $SNR_0$  = original SNR of encoded signal at time  $t_0$  (dB)
- $a$  = attenuation factor (dB/year)
- $t$  = time since the introduction of the format (years)
- $t_p$  = time since peak popularity of the format (years)
- $c$  = cost (currency)

An interesting exercise is to combine all these factors in one graph to get a sense of the quality of the signal extracted, at a certain point in time, with a certain budget. This is represented graphically below.

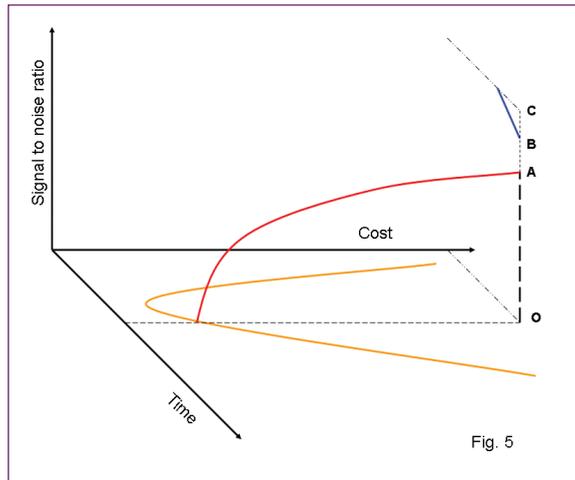


Fig. 5 shows the SNR achieved at a certain cost from a hypothetical carrier at a certain point in time relatively close to the carrier’s peak popularity. The carrier was recorded at the peak of popularity of the format. Segment OA is the achieved SNR. Segment AB is not achieved due to lack of resources, and segment BC is not achieved due to the intrinsic SNR of the carrier at that point.

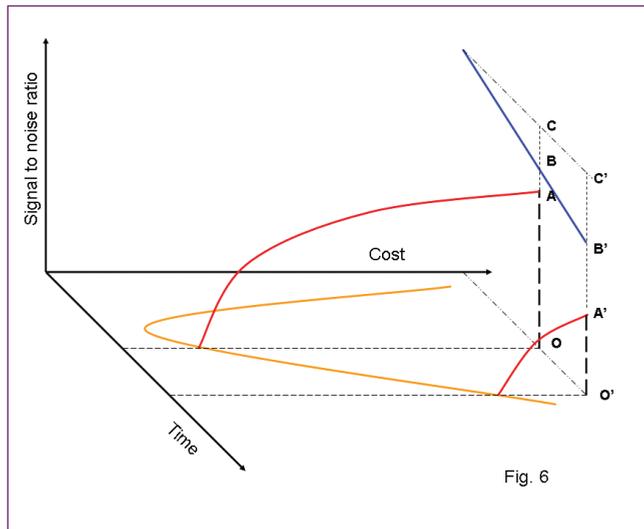


Fig. 6 shows the SNR achieved at the same cost but long after the format has disappeared from the market. Two factors are conspiring against the later sound archivist: intrinsic signal quality has diminished (segment B'C' is the additional SNR loss), and the effort necessary to extract it with a certain resolution has increased (which results in the loss represented by segment A'B'). The signal extracted is O'A', and it is evident that, with the same resources, we can extract far less signal today than we could at the time of peak popularity for that particular format. In other words, you are getting far less bang for the buck. Since this is the trend for *any* format, it stands to reason that delaying signal extraction amounts to a less effective use of resources.

However, all of these predictions are not yet quantified. We need to establish a solid basis to estimate long-term signal extraction.<sup>17</sup> We stand at an interesting point in time, as there are several mass audio digitization projects around the world whose metadata could be used to establish a basis for our path moving forward. It is my hope that it will be so. Until then, our knowledge of content degradation will come only from anecdotal evidence.

17 van der Reyden, Dianne. "The Science-Based Fight Against 'Inherent Vice'". *International Preservation News*, No. 50 (May 2010), p. 5.

## THE IMPACT OF SEMANTIC TECHNOLOGIES ON THE ARCHIVES & THE ARCHIVAL

Guy Maréchal, TITAN, Belgium

At the 2009 IASA Conference in Athens, the Cataloguing and Documentation Committee was re-named Organising Knowledge (OK). The change in name reflects the intention to adopt a new perspective on how we create, enhance, manage, link, and share metadata about our collections and, crucially, to understand and harness the possibilities of the semantic web.

During the following IASA Conferences (Philadelphia, Frankfurt, New-Delhi, and Vilnius) the IASA-OK task force has taken various initiatives focused on “awareness.”

Beyond inspirational papers and a name change, what is next? Those responsible for cataloguing and documentation in established institutions face major challenges in this area. One is to understand better the landscape of resource discovery, navigation, knowledge as brand and product, user behaviours, and how contextualising our metadata as knowledge can promote discovery.

The existing IASA recommendations on “Cataloguing & Documenting” have been designed for human understanding. The intention of semantic technologies is to represent things in a way that computers could ‘understand’ them and present them to people in a form that they can exploit. The IASA recommendations remain valid! Semantic technologies allow the empowerment of recommendations for better visibility and optimal linking of data from archives with current data on the Web. Many archiving organisations have implemented retrieval and access to their catalogue items with the same intentions but without using semantic formalism and standards. This means that, for most organisations, the situation could stand as it is. But, interoperability between archive websites remains unrealized. A possible migration to representations compliant with semantic standards could occur in parallel. This is the reason IASA-OK has given priority to establishing guidance for a graceful migration of existing records associated with a ‘catalogue item’ to interoperable semantic resources.

Semantic technologies offer extra capabilities by constructing typed relationships between things (such as “A” is a part of “B”; “Q” is an instance of a “Person”; or “Q” is the author of “W”), by expressing the internal structure of a work and the links between works and associated documents. Further, native semantic contents will have to be archived with their semantic power.

Semantic technologies are also used for empowering the responsibilities of archival management, in particular: cataloguing, documenting, enriching; managing and clearing rights; retrieving and accessing, and persistent preserving.

### I. Introduction

The current method of managing archival catalog data is called “**flat modeling**,” which refers to the fact that each archived asset can be seen as an island in an archipelago (one catalogue item in a collection).

Although “no archives is an island,”<sup>18</sup> the flat modelling approach is sufficient in most current situations.

The “**networked modelling**” offered by semantic technologies is particularly fitting when the archived material is, by nature, interconnected or more easily retrieved by semantic navigations. Networked modelling fits well for archiving news, sports, political, ethnological, architectural, thesaurus, and multilingual information.

18 The focus of the IASA-2008 conference in Sydney, Australia.

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## 1.1. What is the Semantic Web?<sup>19</sup>

The Semantic Web is a web that is able to describe things in a way that computers can understand. Sentences such as “The Beatles was a popular band from Liverpool”, “John Lennon was a member of the Beatles”, and “Let It Be was recorded by the Beatles” can be understood by people. But how can they be understood by computers? Statements are built with syntax rules. The syntax of a language defines the rules for building the language statements. But how can syntax become semantic? This is what the Semantic Web is all about, describing things in a way that computer applications can understand.

One can argue the fact that the semantic technologies will not emerge by pinpointing their current limitations. The article of Wikipedia in reference to the semantic web (Link 6 in the useful links section at the end of this paper) and Stefano Cavaglieri’s tutorial (included in the bibliography at the end of this paper) include excellent commentary on the subject. However, the dynamic cannot be surrounded! The analysis of the semantic approach and of its potentialities remains worthwhile.

## 2. Illustration of the change by a simple example

The usual way of cataloguing and documenting media assets is to fill-in a metadata template for each of the assets and then to store that data in a database. The list of metadata elements depends on the nature of the asset (e.g., a book or a sound recording), of its cultural domain, and on other classification and sector rules. For example, three typical metadata elements are very general: the name of the asset, the name of the contributor, and the hyperlink to the file representing the asset.

The well-known “*Eine kleine Nachtmusik*” was composed by Mozart. According to XML, Dublin Core, and METS syntaxes, these metadata elements could be expressed in the following manner:

```
<dc:name>Eine kleine Nachtmusik</dc:name>
<dc:contributor>Mozart</dc:contributor>
<mets:file ID="FILE_W002" ADMID="TMD_W002"
MIMETYPE="audio/wav" GROUPID="GW003" SIZE="1"
CHECKSUMTYPE="MD5" CHECKSUM="the_md5_file_check-
sum here">
  <mets:FLocat LOCTYPE="URL" xlink:href="file://root/path/
subdir/S_2069-B-01-W3.ogg" />
</mets:file>
```

Anyone who has a minimum knowledge of music history will understand that it is meant that the composer is Wolfgang Amadeus Mozart (1756–1791) and that the music involved is the usual name of the serenade identified K.525. Everyone should also forget about the hyperlink and simply assume that a file coded in the “ogg” format is available representing the audio recording.

For Information Technology (IT) it is precisely the reverse: “Mozart” is simply and not more than a string of characters and “*Eine kleine Nachtmusik*” another one. However, through the complex hyperlink, IT has what is required for presenting you in evidence the beautiful sound of Mozart’s music!

The fundamental intention of semantic technologies is to ensure, by construction, the **interoperability** of applications and navigations through the expression of the relations existing between representations of concepts and their instances with their characteristics. Such representation is usually expressed according to a combination of standards languages (using the XML syntax) of the W3C, in particular, RDF (Resource Description Framework) and OWL (Ontology Web Language).

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<sup>19</sup> See the Tutorial of Stefano Cavaglieri (included in the bibliography at the end of this paper).

Semantic technologies support keeping current representations according to the usual cataloguing and documentation rules expressed using the well known DC, MARC, or MODS models, among others (collectively referred to as “**Flat**” models). Semantic models (collectively referred to as “**Rich**” models) can hook into and integrate the metadata from “Flat” models.

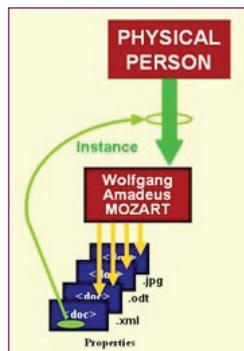


Figure 1: “Is an instance of”

In the previous example, for semantic technologies, the representation of Mozart is a resource being an instance of the class of things called “Physical person.” Figure 1 illustrates the approach. The rectangles represent “Resources” being identified. The upper red rectangle has the class “Physical person.” The relation “**is an instance of**” is expressed by the green arrow.

The middle red rectangle represents the resource carrying the representations and properties of Mister Wolfgang Amadeus Mozart as an instance of the class “Physical person.” It ‘owns’ the lower rectangle representing the existence of the resource and its associated properties, including the relation “is an instance of,” which links it to the class “Physical person.” The instance inherits all the characteristics of “Physical person.”

The lower blue rectangles represent the digital files representing Mozart. In the example, the .xml file could carry the classical “Flat” model according to the Dublin Core of the structural representation of his life (e.g., date of birth; marriage; or date of death); the .odt file could carry a bibliography; and the .jpg file could carry the scan of a painting representing him.

Any of the relations could, through the Web, link data present in distinct databases: this is what is called “Linked Open Data” (LOD). The OWL definition of the class “Physical person” is in one semantic database (FOAF for example) while its instances, including you and “Wolfgang Amadeus Mozart” could be described in a variety of independent semantic databases linked by LOD and alias. This constructs a **network of related data**.

### 3. The graceful migration of “Flat models” to “Networked models”

The existing IASA recommendations on “Cataloguing & Documenting” are intended, meant, and dedicated to be applied by human, expert cataloguers. The expression of metadata and identifiers is assumed to be read by humans.

Figure 2 is an excerpt of these recommendations (Section 0.B.2). It represents an example of what will be the subject of the 150 pages of the recommendations.

Joyride [sound recording] / Roxette. - Solna : EMI, p 1991.  
 - 1 sound disc (ca. 49 min.) : analogue, stereo, 33 rpm ; -  
 30 cm  
 Words and music: Per Gessle (unless otherwise stated)  
 Lyrics on inner sleeve  
 Contents: Joyride -- Hotblooded / P. Gessle, M.  
 Fredriksson -- Fading like a flower (every time you leave)  
 --Knockin' on every door -- Spending my time / P. Gessle,  
 M. Persson -- Watercolours in the rain / P. Gessle, M.  
 Fredriksson, C. Ofwerman -- The big L -- (Do you get)  
 Excited? / P. Gessle, M. Persson -- Small talk -- Physical  
 fascination -- Things will never be the same -- Perfect day  
 / P. Gessle, M. Persson  
 EMI: 7960481

Figure 2: Catalogue metadata

The rules for elaborating these catalogue items are detailed in the recommendations. The expertise of the cataloguers ensures the correctness and fitness of the data. A trained reader will understand the record without ambiguity. The casual reader will have some difficulties to fully understand and exploit the data. But, in most archiving organisations, access is ensured through Web pages created from queries of records in a database. Hence, for casual users, the intuitive presentation of Web pages facilitates access and understanding.

Everybody knows **Wikipedia**, the open encyclopaedia. A few years ago, volunteers coded its structures and coding rules according to semantic standards. They also developed a program for an automatic migration of Wikipedia records into a semantic database called **DBpedia**—a crowd-sourced community effort that extracts structured information from Wikipedia and makes this information available on the Web according to the “Linked Open Data” protocol. DBpedia allows you to ask sophisticated queries against Wikipedia. It links the different data sets on the Web to Wikipedia data. It provides easier access to the huge amount of information in Wikipedia and allows this information to be used in new and interesting ways. Furthermore, it might inspire new mechanisms for navigating, linking, and improving the encyclopaedia itself. Wikipedia and DBpedia are both available in parallel. More than 10,000 websites are now accessible through the Linked Open Data protocol, which constitutes a huge unique distributed database.

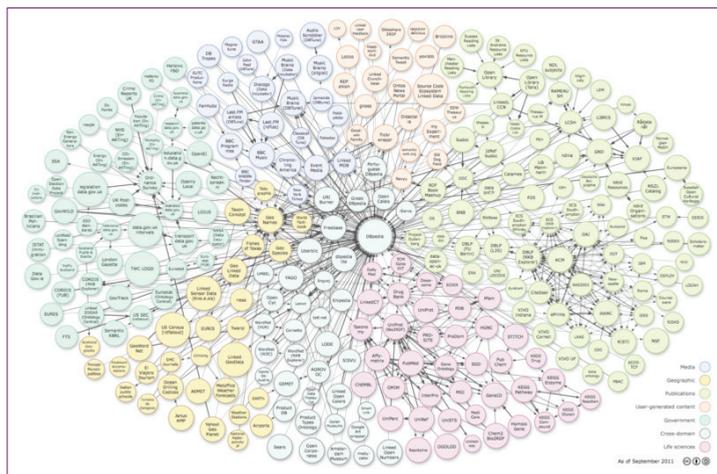


Figure 3: The semantic Web (as September 2011)

Figure 3 represents the main Web-3 sites as of September 2011. The current scenario can no longer be presented as one figure. The prominent place of DBpedia is clearly visible in the figure. In the media sector (in blue) the BBC appear to be very active.

This same type of initiative could easily be implemented for the migration of the records associated with archives that are documented according to IASA recommendations. It could become a concrete initiative and will be analysed during the IASA-2014 conference in Cape Town, South Africa. The process will be to represent the IASA guidelines and recommendations according to semantic standards. This step will initiate the issue of what is called an **“IASA-Knowledge Base.”** It constitutes a formalisation “understandable” by computers of the existence of and of the meaning of the red additions presented in Figure 4.

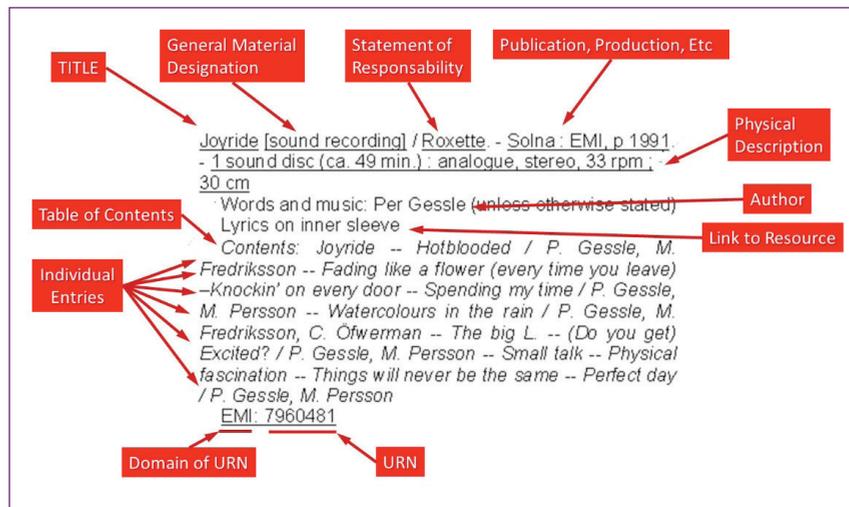


Figure 4: The initialisation of the IASA-Knowledge Base

For each of the “red entries,” semantic formalism will express not only the typing and properties, but also the coding rules for the representations dedicated to people. Figure 4 is the same as Figure 2 but simply the rules for “understanding” the intentions and their expressions are now expressed in a form “understandable” by computers and by humans (independently of the selected access device).

Similar to what has been done for harvesting Wikipedia to create DBpedia, each archive database could be used to create its semantic database mirror. This could be done under the direction of the IASA-KB (a tool to support mapping IASA-conformant catalogue records to valid RDF instances). Such extractors are usually designed for systematic updates to ensure that the semantic database remains a mirror of the flat database. It is a synchronisation process allowing the presence of both representations standing in parallel. The inherent multilingual capability of semantic technologies implies that contextual translations could be made or verified.

The resulting semantic database (SDB) could be used only within the local organisation but could also be accessible and referenced on the Semantic Web. In this second case, your website would become a new node in the diagram in Figure 3. In both cases the SDB will be accessible according to the LOD protocol. Obviously, here “open” does not mean that any free access is allowed! It means that, if access is allowed, the data will be “understandable” in an open, standardized way. It means the opposite of “proprietary” coding.

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## 4. Enhancing the Knowledge Bases and the contents of Semantic Databases

The representation of knowledge has to be seen in independent levels, distinctly from the point of view of humans and from that of ICTs (Information and Communication Technologies). Each of the levels could be empowered by the next higher level. The movement between levels occurs for humans through higher cultural and social education and for ICTs by training, trials, validations, or error corrections, under the control of educated persons.

Each of the ways of representing knowledge could be added to the Knowledge Bases and serve the Semantic Databases of the instances.

### 4.1. Textual representation

The textual expression of knowledge is very powerful for producing knowledge and for accessing it by humans. In this level, interoperability is ensured between individuals sharing the same culture, the same language, and having common social repositories and locators. The complexity and the richness of grammar rules, of syntaxes, of poetry; the voluntary multiple, evocative, and ambiguous meanings; and the games between sound and sense all open doors to utterances that are above knowledge. These expressions can be stored in a persistent manner with no loss of information, but they are not normalised and have poor precision and recall capabilities. This is the level of the Web-1. When using semantic technologies, the structure of sentences and other logical elements could be extracted in a similar way. The same with identifying that some of the words in the text are names of typed items (e.g., persons, organisations, places, dates, moments, periods, or concepts). Each of the typed items could be an object of a specific LOD entry. Each applicable occurrence of the word in any text could be linked with the article or to a simple tag. Semantic technology allows for resolving ambiguities in free-text representation: the word Paris usually refers to the capital of France; but it could also designate a small city in Texas or the surname of a person. The empowerment of texts by semantic technologies becomes also an empowerment of Knowledge Bases; and vice-versa, the use of existing Knowledge Bases could be made in order to empower texts and local Knowledge Bases. The main empowerments of KBs take the form of Tags, Taxonomies, and Thesauri.

### 4.2. Tagging

Tagging has a low threshold. For most cases it is sufficient for a single human user. At this level, interoperability is ensured between individuals and machines through simple standards. Tagging offers moderate precision on large databases, although there remains poor precision with regard to the meaning attached to the tags. The control of consistency is also limited at this level. This is the level of the Web-2. Tags could be associated to structural or typed classes and be parts of KB or linked in instances.

### 4.3. Taxonomies and Thesaurus

This level offers very high precision but, by nature is difficult and tedious to maintain and is hardly scalable. Interoperability at this level is ensured as long as no changes occur. Combined with the level of free-text expression, this level could be very powerful. This is the level of Web-2 with data mining enrichment tools. Retrieval services such as Google and Yahoo have demonstrated the power of this level, but simple searches could generate thousands of hits. Taxonomies and Thesauri could be associated with structural or typed classes, used in Tags, and could be parts of KBs or linked in instances. Important thesauri and taxonomies could be combined to construct networks of Multilingual Knowledge Bases (MKB). UNESCO has such a MKB for which plans are under way to present it in LOD.

### 4.4. Semantic

Semantic expressions of knowledge are very powerful for producing or accessing knowledge by ICTs. But the modes of representation of this knowledge, in a way suitable for human understanding, remain a research area. At this level, precision and scalability are

without limits and interoperability is ensured for all the situations where formal modelling could apply. Recall and retrieval is optimum—the thousands of returns from a query at level 3 are refined to only pertinent and serendipitous hits. In concrete trials in large semantic databases, we often obtain only 30 replies (with 20 or more pertinent); while for the same searches at level 1 (Web-1), millions of replies were frequent. Navigation in semantic databases and LOD is simple. This is the level of Web-3.

#### 4.5. Operational

Semantic formalisms open the door to the capacity of computation, inference, and operations through “intelligent” agents. Such associated technologies are partly available and already in use in targeted domains. Again, this means that the empowerments of SDBs and of MKBs will occur in an automatic way made by ICT processes working in the background.

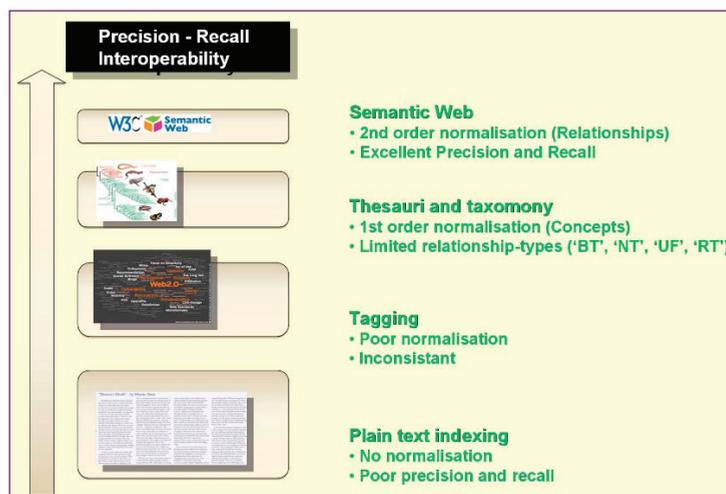


Figure 5: The ways of representing Knowledge to be federated by semantic technologies<sup>20</sup>

#### 4. Structuring inside the media

Some media have, by nature, an inner structure. Semantic technologies cover the inner structuring of these cases: the “Fragment” standard.

A typical example is the recording of an interview. It implies interviewer(s), interviewee(s) and the subject(s) of the interview. The semantic structuration would typically include:

- presentation of the agents (links to the MKB(s))
- presentation of the subjects (links to the MKB(s))
- transcription of the sentences pronounced by each agent
- translation of these sentences
- keyword spotting and their linking to the associated tags
- documentation of the event process

Another typical example is audio-visual media associated with a sporting match or with a television news program.

<sup>20</sup> Illustration by courtesy of Maarten Verwaest.

For these important cases, specific ontologies have been designed for the modelling of the event processes and of their associated media. In particular, a combined ontology for News and Sports // Events and Media has been developed. In order to ease the exchange of news, the International Press Telecommunication Council (IPTC) has developed the NewsML Architecture (NAR).

It combines the NewsML G2 standard and the EventsML G2 (see Link 9 in the references section of this paper: <http://www.eurecom.fr/~troncy/Publications/Troncy-iswc08.pdf>).

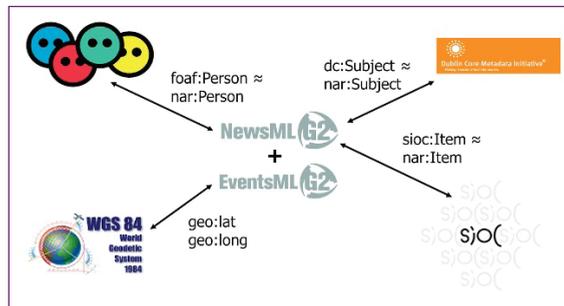


Figure 6: The NAR profile

This technology allows for structuring and labelling as illustrated in Figure 7. Similar allowances are made for interviews and the news (from headers; weather forecasts; sport sequences, up to the final summary).

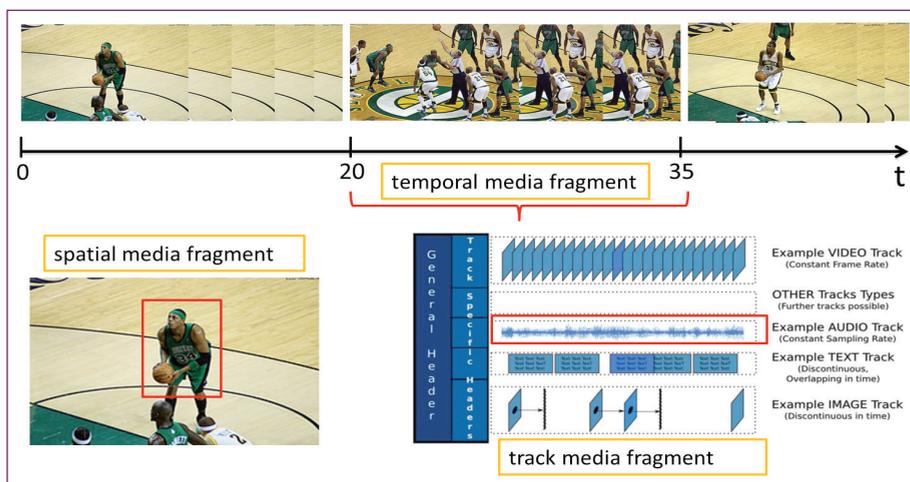


Figure 7: Illustration of an NBA match<sup>21</sup>

## 5. The power of semantic technologies for archiving processes and management

Semantic technologies are powerful for the empowerment of archives. But they can also be valuable in managing archival processes and duties.

The previous sections have demonstrated the power of semantic technologies for cataloguing, documentation, and enrichment. Their power for managing archives and clearing the associated

<sup>21</sup> Image by courtesy of Erik Mannens.

rights is also demonstrated in many projects (in particular the Presto4U project). Semantic formalisms improve navigation, discovering, and access. The power of semantic technologies for “Preservation & Persistence” according to the OAI standard have also been demonstrated.

## 6. Conceptual reference models and resolvable identifiers

Semantic technologies are powerful for implementing “Conceptual Reference Models.”

The most important models are the FRBR standard (Functional Requirements for Bibliographic Records) and its associated FRBR-OO (Cidoc-CRM). These are already in the semantic trend.

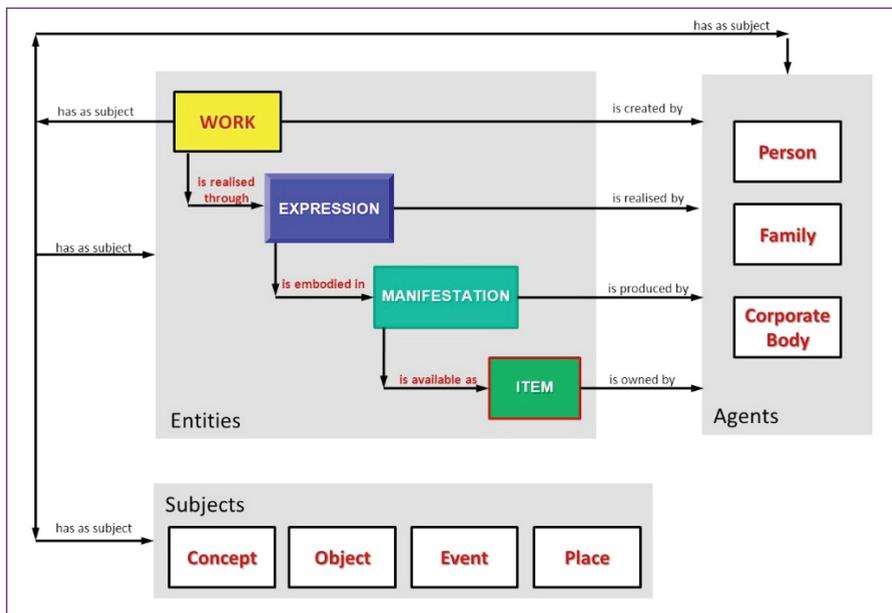


Figure 8: FRBR (Entities, Subjects and Agents)

FRBR is a powerful conceptual tool for bibliographic situations and associated items. It could serve as a reference in many derived domains. However, its mapping to semantic technologies has required adaptations, in particular to cope with the capacity of declaration of the existence of an object, independently of the declaration of the existence of the several independent models of the object; the incorporation of management of “Rights” information; the reuse of works in works; and the explicit declaration of roles, of characters, and of the temporal availability of works (such as acquiring rights to enjoy contents in streaming mode).

In the context of two projects (Memories and MediaMap), the non-profit association, Titan, has migrated the FRBR concepts into a full semantic representation, covering any object and subjects and their documentations and structuration. This effort has been undertaken by collaboration with the UNESCO MoW programme, the Radio France archive department, the Celtic telecommunication sector of the Eureka programme, and a few others. The result has been named FRAR, standing for Functional Requirements for Assets and Rights.

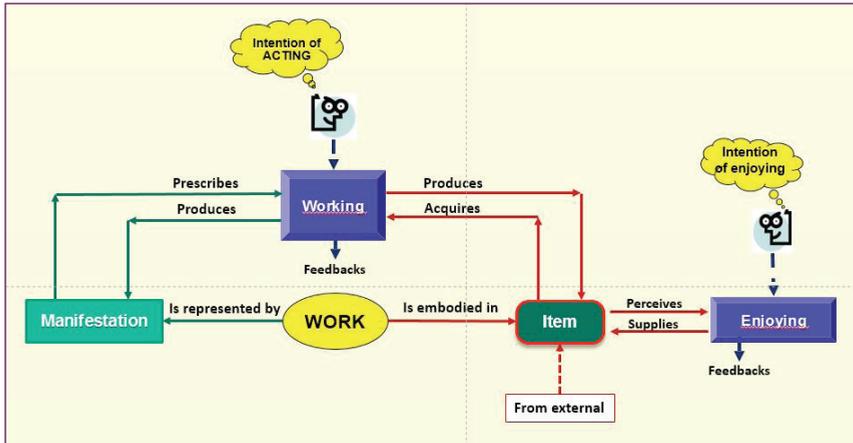


Figure 9: FRAR (Functional Requirements for Assets and Rights) Top view

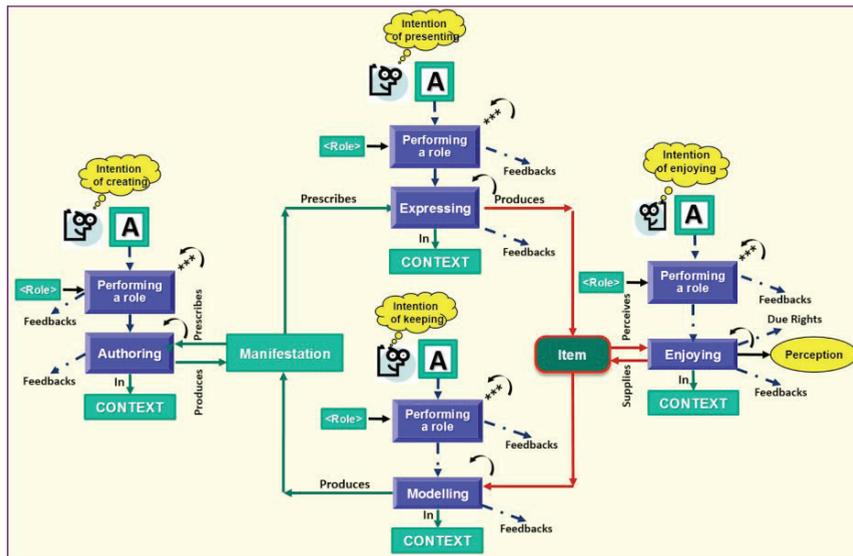


Figure 10: FRAR (Functional Requirements for Assets and Rights) Detailed view

It is out of the scope of this paper to detail the FRAR model. It is simply a way of introducing the need for a reference conceptual model as foundation for collaborative work in the AV archiving sector.

Another important area to be covered is the elaboration of an open identification system that could cope with many identification systems for the objects and for the models of the objects. The systems should be able to resolve URN and URL in both cases.

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## 7. The IASA-OK Task-Force

In IASA, the OK dynamics is, up to now, a transient effort of a few persons. After a few years focused on “**awareness**,” I am convinced that IASA should enter into a more concrete limited set of actions organised jointly with other similar associations such as FIAT and AMIA. Links with UNESCO also should be established, in particular with the Memory of the World (MoW) programme and the Multilingual Cultural and Educational thesauri. Such projects could be sponsored by public authorities. These projects should also be built in continuity with existing achievements. The IASA-OK should set the foundation for a possible future preparation of Recommendations and Rules for structuring the archives and managing them.

IASA is entering into a third phase of its focus where IASA-OK can have a leading presence.

**Foundation: Phase 1: AV assets represented according to ANALOGUE models**

Restoration and preservation of carriers; cataloguing; metadata; ethical guidelines

**2004: Phase 2: AV assets represented according to DIGITAL FLAT models**

AV carriers; formats; wrappers; records in databases

**2011: Phase 3: Native semantic & interoperability of Objects, Subjects, and their Relations**

Archiving of complex subjects (series with bonus and associated documents); preservation of the substances; profiles; ontologies; taxonomies; cataloguing; knowledge bases; metadata according to several standards; linked open data

## 8. Conclusion

The semantic enhancement of existing “Flat model” databases can occur through automatic migration processes. The prerequisites are the construction of Semantic Knowledge Bases specific to the local organisations and their linking to general purpose SKBs. By systematic synchronisation the “Flat model” database and the “Networked model” database could remain active in parallel ensuring a graceful migration to the power of semantic technologies.

## 9. Acknowledgements

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**Evain**, JP and T. Bürger. “Semantic Web, linked data and broadcasting.” In EBU T Review (2011 Q1).

**Mannens**, Erik. Interoperability of Semantics in News Production. ISBN 978-90-8578-415-9 (2011 Q).

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## II. Useful links

- [Link 0] <http://www.iasa-web.org/cataloguing-rules>
- [Link 1] [http://www.ted.com/talks/tim\\_berners\\_lee\\_on\\_the\\_next\\_web.html](http://www.ted.com/talks/tim_berners_lee_on_the_next_web.html)
- [Link 2] <http://www.w3.org/DesignIssues/LinkedData.html>
- [Link 3] <http://www.w3.org/2008/WebViewideo/Annotations>
- [Link 4] <http://www.w3.org/TR/2010/WD-mediaont-10-20100608/>
- [Link 5] [http://tech.ebu.ch/docs/tech/tech3293v1\\_2.pdf](http://tech.ebu.ch/docs/tech/tech3293v1_2.pdf)
- [Link 6] [http://en.wikipedia.org/wiki/Semantic\\_Web](http://en.wikipedia.org/wiki/Semantic_Web)
- [Link 7] [http://www.iptc.org/site/News\\_Exchange\\_Formats/NewsML-G2/](http://www.iptc.org/site/News_Exchange_Formats/NewsML-G2/)
- [Link 8] <http://www.w3.org/TR/WebIDL/>
- [Link 9] <http://www.eurecom.fr/~troncy/Publications/Troncy-iswc08.pdf>

## CREATING METADATA BEST PRACTICES FOR DIGITAL A/V RESOURCES

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### 1. Abstract

The University of Illinois Library is in the process of creating new and updated metadata best practices documentation for digital audiovisual (A/V) resources to augment guidelines established in 2007. The goal has been to create documentation that is simple enough to provide general guidelines to the entire campus community while ensuring the integrity of the metadata submitted with A/V resources to the library that work for both the access and the preservation of resources created and purchased by the campus. The library underwent a research phase that spanned a period of several months, interviewing stakeholders and surveying the current state of the art in the broader metadata landscape. After the research phase, it was decided to limit the scope of the recommendations to a set of required and optional metadata elements only, leaving the choice of schema selection to the ingesting repository systems. However, recommendations for potential schemas have also been included for reference. Further recommendations have been made for automated metadata extraction tools such as MedialInfo<sup>22</sup> and Jhove<sup>23</sup> that will increase the level of metadata uniformity in the digital A/V resources currently being created and managed by the campus, while facilitating submission to the library's preservation repository. This paper will outline the findings from the research phase and share the new and updated library's Digital A/V Metadata Best Practices.

### 2. Introduction/Background

The University of Illinois Library UIUC has provided institutional-based metadata best practices since 2007 when the library embarked on its first large-scale digitization project. The metadata best practices included different metadata aspects, such as a separate best practice guideline for different formats, (e.g., text, image, audio, and visual) along with descriptive, administrative, and preservation metadata guidelines. As the volume of digital resources increased over the years and the library began developing and implementing a preservation repository for digital resources, the need to have a new and updated metadata best practice document for A/V resources emerged. As a first step, the library decided to have an initial research phase to identify the primary metadata requirements for digital A/V resources as well as to gain a broad view of the current metadata landscape with regard to available metadata standards and institutional best practices presently employed by other academic libraries. Several primary questions have been the focus of initial investigation including:

- Why should we have different metadata for A/V resources?
- What are the characteristics of metadata for A/V resources?
- What metadata standards are available?
- What are the commonly used/needed metadata elements for A/V resources?
- Which elements are optional and which are required?
- What tools are available for technical metadata extraction?

This paper will briefly detail UIUC Library's exploration into each of these questions and share the lessons learned from the process that can and should be considered when creating new, user-friendly metadata best practices.

22 <http://mediaarea.net/en/MedialInfo>

23 <http://sourceforge.net/projects/jhove/>

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### 3. Findings

#### 3.1. Why should we have a different metadata for A/V resources?

Digital A/V resources carry with them a variety of essential characteristics that differ greatly from conventional analog library resources. When one considers the wide variety of compression formats, file types, software and hardware requirements, and creation and dissemination methods associated with digital A/V files, it becomes quickly apparent that more than a traditional set of descriptors is necessary to capture and preserve all of their essential characteristics. As Minglian, Xingxing, and Jiuzhen explain:

Different media types mean different characteristics of information resources in format, storage environment, and reading equipment...The media types of audiovisual resources include text, image, audio and moving picture...[The] storage mediums of audiovisual resources [are] quite complicated. DVD, LD, VCD, videotapes of many specifications, CD, recordings, audiotapes, and magnetic tapes are the most commonly used storage mediums. Meanwhile DVW, MII, DVC, SX, DS, digital streaming tapes and hard disk are also in the market. The content on these storage medias can be made into different compression formats according to its purpose, such as TIFF, GIF, JFIF, and PICT...Compared to other kinds of information resources, creators and physical characteristics for audiovisual resources are very complicated, especially for film and video recordings.<sup>24</sup>

Having established the need for unique metadata for digital A/V resources, the specific characteristics of digital A/V objects were examined to gain a better understanding of what these unique metadata requirements are.

#### 3.2. What are the characteristics of metadata for A/V resources?

Metadata requirements for digital A/V resources can be divided into three distinct categories: structural, descriptive, and administrative. Structural metadata is used to link the metadata record itself to the digital resource.<sup>25</sup> It also describes the configuration of complex objects that are comprised of multiple parts or sections and is often closely associated with the content management system. Since digital resources are not placed on physical shelves in the sense that books and physical objects are, this form of metadata is necessary for ensuring a clear understanding of the constituent parts of a resource, its extent, and its relationship to other items within an institution (a digital copy of an image as related to the original analog print).

Descriptive metadata is metadata that summarizes the content of the digital object including such elements as 'Title', 'Author', 'Subject', and 'Publisher'. This can be defined further as the metadata that represents the intellectual content and the pertinent information about its (the metadata's) creation.<sup>26</sup> This descriptive metadata is then enriched through the use of administrative metadata which can be subdivided generally into three distinct metadata classes: technical, rights management, and source metadata. Technical metadata describes the characteristics of the file proper (e.g., file size, color-space, sampling-rate, encoding, and compression). Rights

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24 Minglian, D., Xingxing, Y. and Jiuzhen, Z., "A Study on Audiovisual Metadata". *International Conference on Dublin Core and Metadata Applications*. last modified October, 2004: <http://dcpapers.dublincore.org/pubs/article/view/776/772>

25 "Metadata and Digital Video," JISC. Accessed April 21, 2014: <http://www.jiscdigitalmedia.ac.uk/guide/metadata-and-digital-video>

26 "Metadata Best Practices," University of Colorado Digital Library. Accessed April 21, 2014: <https://www.cu.edu/digitallibrary/cudlmetadatapp.pdf>

metadata describes copyright status, user restrictions, licensing, and any other constraint that might affect the use of the resource. Finally, source metadata describes the source from which the digital object is derived. There are varying degrees of granularity or description which can be produced through the employment of each of these different types of metadata, the degree of which will have to be determined by the institution based upon the essential characteristics of the digital resource and the needs of their user community.

### 3.3. What metadata standards are available?

There are a variety of metadata standards from which to choose when considering the preservation of digital A/V resources. A wide selection of these standards were explored in the initial research phase of this project including: AudioMD, METS, METSRights, MODS, MPEG7, MPEG2I, PBCore, PREMIS, Qualified Dublin Core, and VideoMD.

AudioMD, VideoMD, PBCore and PREMIS are particularly strong metadata schemas for describing digital A/V resources with METS serving as a powerful wrapper for combining elements from different schemas based on the needs of the user community and the repository. However, after an initial investigation it was determined that the actual prescription of any one metadata standard went beyond the intended scope of the project (which is to create a simple guideline for the entire campus community—neophyte and expert alike) and was secondary to the actual definition of key or required metadata elements. Nevertheless, the final document will include a section pertaining to available metadata schemas with links to appropriate documentation, a list of which can be found in Table 1.

| Standard        | Documentation   |
|-----------------|---|
| METS            | <a href="http://www.loc.gov/standards/mets/">http://www.loc.gov/standards/mets/</a>   |
| METSRights      | <a href="http://www.loc.gov/standards/rights/">http://www.loc.gov/standards/rights/</a>   |
| MODS            | <a href="http://www.loc.gov/standards/mods/">http://www.loc.gov/standards/mods/</a>   |
| MPEG7           | <a href="http://mpeg.chiariglione.org/standards/mpeg-7/mpeg-7.htm">http://mpeg.chiariglione.org/standards/mpeg-7/mpeg-7.htm</a>   |
| MPEG2I          | <a href="http://mpeg.chiariglione.org/standards/mpeg-2I">http://mpeg.chiariglione.org/standards/mpeg-2I</a>   |
| MPEG's DDL      | <a href="http://mpeg.chiariglione.org/standards/mpeg-7/description-definition-language">http://mpeg.chiariglione.org/standards/mpeg-7/description-definition-language</a> |
| MPEG's RDD      | <a href="http://mpeg.chiariglione.org/standards/mpeg-2I/rights-data-dictionary">http://mpeg.chiariglione.org/standards/mpeg-2I/rights-data-dictionary</a>                 |
| PBCore          | <a href="http://pbcore.org/index.php">http://pbcore.org/index.php</a>   |
| PREMIS          | <a href="http://www.loc.gov/standards/premis/v2/premis-2-0.pdf">http://www.loc.gov/standards/premis/v2/premis-2-0.pdf</a>   |
| VideoMD/AudioMD | <a href="http://www.loc.gov/standards/amdvmd/">http://www.loc.gov/standards/amdvmd/</a>   |

Table 1: Potential Metadata Standards for Digital A/V Resource Description

### 3.4. What are the commonly used/needed metadata elements for the A/V resources?

The California Digital Library (CDL) Guidelines state: "Whenever possible, provide the most granular and richest metadata possible."<sup>27</sup> This is a commendable goal, but one which must also be tempered by the needs of the user community. A list of possible A/V metadata elements was compiled (see Table 2) during the research phase, extracted from publicly available institutional standards as examples of current elements in use. Though there is some degree of overlap between certain numbers of these, they nevertheless provide a fairly comprehensive representation of the scope of available metadata elements for digital A/V resources.

| Element               | Description   |
|-----------------------|---|
| Alternative Modes     | Equivalent modes of the item.   |
| Aspect Ratio          | The ratio of horizontal and vertical proportions.   |
| Bit Depth             | How much data is sampled when information is digitized, encoded or converted                |
| Channel Configuration | The arrangement or configuration of specific channels.                                      |
| Checksum              | Ensures file completeness and integrity.  |
| Color Space           | The color space of the resource, (RGB, CMYK, black, white, gray scale, color etc.).         |
| Contributor           | The people or organizations that contributed to the item's creation.                        |
| Contributor Role      | The responsibilities of the person or organization.   |
| Coverage Spatial      | Geographic location covered.  |
| Coverage Temporal     | The covered time-span.  |
| Creator               | Person or group primarily responsible for the item's creation.                              |
| Creator's Role        | The responsibilities of the person or group designated as creator, (producer, writer, etc.) |
| Data Rate             | The data rate for the individual item, (frame rate etc.).                                   |
| Date Created          | The date the item was created.  |
| Date Issued           | The date the item was issued.   |
| Description           | A prose description of what the item is about.  |
| Dimensions            | The dimensions of the physical object, (letter box, jewel case, etc.)                       |
| Duration              | The overall length of the item.   |
| Encoding              | The method by which the item is compressed by scheme.                                       |
| File Size             | The size of the digital item.   |
| Genre                 | Description of an item's genre.   |
| Identifier            | Unique ID for the item, (e.g. UPC code).  |
| Language              | The primary language or languages used in the resource.                                     |

27 "Guidelines for Digital Objects," California Digital Library. Accessed April 21, 2014. [http://www.cdlib.org/services/access\\_publishing/dsc/contribute/docs/GDO.pdf](http://www.cdlib.org/services/access_publishing/dsc/contribute/docs/GDO.pdf)

| Element              | Description   |
|----------------------|---|
| Location Digital     | The location of the digital item.                                 |
| Location Physical    | The location of the physical item.                                |
| Media Type           | The type of media, (e.g. text, moving image, sound, etc.).        |
| Migration            | Administrative information about migration events.                |
| Physical Description | Physical description of the item, (e.g. CD, DVD, etc.)            |
| Playback Speed       | The rate at which the item should be played.                      |
| Publisher            | The organization responsible for the distribution of the item.    |
| Publisher's Role     | The responsibilities of the publisher.                            |
| Recording Equipment  | Brand, name, and model number of recording equipment.             |
| Related Identifier   | Identifier to locate the items related to the described resource. |
| Rights Link          | URI to the rights statement.                                      |
| Rights Summary       | A rights statement describing how the item may be used.           |
| Sampling Rate        | How often the data is sampled for digitization.                   |
| Subject              | Headings or keywords related to the topic.                        |
| Title                | The title of the item or track.                                   |
| Tracks               | The number and type of tracks found in the item.                  |
| Type                 | The type of media in the track.                                   |

Table 2: Possible A/V Metadata Elements

### 3.5. Which elements are optional? Which are required?

Having reviewed a rather large list of possible metadata elements, it is important to again emphasize that the selection and use of any one element will depend largely upon the institutional needs of both the repository and its users. Several institutions' standards were reviewed and it was found that most only required a small 'core' set of elements, leaving the rest as optional. Five institutions were consulted including: the University of Colorado, (UC) the University of Notre Dame, the University of North Carolina, Rutgers University, and UIUC's own previous guidelines from 2007. They were selected based upon the availability of their best practices documentation to a web search. Though most institutions had a lengthy list of optional or available metadata elements, UC and UIUC were the only two of the five that had a set of clearly required elements. These elements included: 'Date of Original', 'Collection Name', 'File Format', 'File Size', 'Fixity', 'Holding Institution', 'Identifier', 'Language', 'Preservation Level', 'Publisher', 'Relationship', 'Rights Management', 'Sub-collection Name', 'Subject', 'Title', and 'Type'. These findings were influential in the development of the new UIUC library's metadata best practice documentation.

### 3.6. What tools are available for technical A/V metadata extraction and automation?

There are a number of freely available metadata toolkits and extractors for digital media. The most widely used and highly recommended in our interview process (detailed below) was the MedialInfo tool. MedialInfo is a unified display of the most relevant technical and tag data for video and audio files. It extracts a wide variety of technical metadata elements from a fairly representative selection of media file formats (see Table 3). MedialInfo is free and open source and can be downloaded by anyone who works with A/V resources. Seven other metadata toolkits were considered and are listed below with descriptions derived from their respective websites:

1. **DC Meta Toolkit**<sup>28</sup> – Free and open source, the Dublin Core Meta Toolkit gives DSpace administrators the ability to convert large amounts of information from their desktop database programs into DSpace compatible Dublin Core metadata. The toolkit provides a number of out-of-the-box database structures to ease data collection as well as enabling users to create custom converters for existing databases.
2. **DROID**<sup>29</sup> – Also free and open source, the DROID (Digital Record Object Identification) is an automatic file format identification tool. It is the first in a planned series of tools developed by The National Archives of the U.K. under the umbrella of its PRONOM technical registry service.
3. **ExifTool**<sup>30</sup> – ExifTool is a platform-independent Perl library plus a command-line application for reading, writing and editing meta information in a wide variety of files. ExifTool supports many different metadata formats including EXIF, GPS, IPTC, XMP, JFIF, GeoTIFF, ICC Profile, Photoshop IRB, FlashPix, AFCP and ID3, as well as the maker notes of many digital cameras by Canon, Casio, FLIR, FujiFilm, GE, HP, JVC/Victor, Kodak, Leaf, Minolta/Konica-Minolta, Nikon, Nintendo, Olympus/Epson, Panasonic/Leica, Pentax/Asahi, Phase One, Reconyx, Ricoh, Samsung, Sanyo, Sigma/Foveon and Sony.
4. **JHOVE**<sup>31</sup> – Another free and open source tool, JHOVE is a format-specific Digital Object Validation API written in Java. Currently supported formats are AIFF, ASCII, Bytestream, GIF, HTML, JPEG, JPEG 2000, PDF, TIFF, UTF-8, WAV, and XML. Documents are analyzed and checked for being well-formed (consistent with the basic requirements of the format) and valid (generally signifying internal consistency). JHOVE notes when a file satisfies specific profiles within formats (e.g., PDF/X, HTML 4.0).
5. **Metadata Extraction Tool**<sup>32</sup> – Free and open Source, the Metadata Extraction Tool was developed by the National Library of New Zealand to programmatically extract preservation metadata from a range of file formats like PDF documents, image files, sound files, Microsoft office documents, and many others. The tool was initially developed in 2003 and released as open source software in 2007. The current version can be downloaded from the SourceForge download page.
6. **Metadata Extractor**<sup>33</sup> – The Metadata Extractor is a straightforward Java library for reading metadata from image files. Like the others, it is also free and open source and will process files of type: JPEG, TIFF, PSD, PNG, BMP, GIF, Camera RAW (NEF/CR2/ORF/ARW/RW2).
7. **VLC Media Player**<sup>34</sup> – VLC is a free and open source cross-platform multimedia player and framework that plays most multimedia files as well as DVD, Audio CD, VCD, and various streaming protocols. It is useful in a metadata context in that it will open most audio/visual file types and return technical metadata.

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28 <http://www.wijiti.com/projects/dcmetatoolkit>

29 <http://www.nationalarchives.gov.uk/information-management/projects-and-work/droid.htm>

30 <http://www.sno.phy.queensu.ca/~phil/exiftool/>

31 <http://sourceforge.net/projects/jhove/>

32 <http://meta-extractor.sourceforge.net/>

33 <https://code.google.com/p/metadata-extractor/>

34 <http://www.videolan.org/vlc/index.html>

|                         | mkv  | ogg<br>ogm | Riff | mpeg<br>1/2 | Mpeg4<br>M4a | mp2<br>/mp3 | Wm   | Qt   | Real | Ifo | AC3 | DTS | AAC | MAC | Flac | Other<br>Audio |
|-------------------------|------|------------|------|-------------|--------------|-------------|------|------|------|-----|-----|-----|-----|-----|------|----------------|
| <b>General</b>          | Part | Yes        | Part | Yes         | Yes          | Yes         | Part | Part | Part | Yes | Yes | Yes | Yes | Yes | Yes  | Yes            |
| <b>Duration</b>         | No   | Yes        | Yes  | Yes         | Yes          | Yes         | Yes  | Yes  | Yes  | Yes | No  | No  | No  | Yes | Yes  | Yes            |
| <b>Author</b>           | No   | Yes        | No   |             | Yes          | Yes         | Yes  | Yes  | Yes  | Yes |     |     |     | Yes | Yes  | Yes            |
| <b>Title</b>            | No   | Yes        | No   |             | Yes          | Yes         | Yes  | Yes  | Yes  | Yes |     |     |     | Yes | Yes  | Yes            |
| <b>Subtitle</b>         | No   | Yes        |      |             |              | Yes         |      |      |      |     |     |     |     | Yes | Yes  | Yes            |
| <b>Location</b>         | No   | Yes        |      |             |              |             |      |      |      |     |     |     |     |     |      |                |
| <b>Album</b>            | No   | Yes        |      |             | Yes          | Yes         | Yes  |      |      |     |     |     |     | Yes | Yes  |                |
| <b>Track number</b>     | No   | Yes        |      |             | Yes          | Yes         |      |      |      |     |     |     |     | Yes | Yes  |                |
| <b>Track count</b>      | No   |            |      |             | Yes          | Yes         | Yes  |      |      |     |     |     |     |     |      |                |
| <b>Set number</b>       | No   |            |      |             | Yes          | Yes         |      |      |      |     |     |     |     |     |      |                |
| <b>Set count</b>        | No   |            |      |             | Yes          | Yes         |      |      |      |     |     |     |     |     |      |                |
| <b>Date</b>             | No   | Yes        |      |             | Yes          | Yes         | Yes  | Yes  | Yes  | Yes |     |     |     |     |      |                |
| <b>Recording date</b>   | No   |            |      |             |              | Yes         |      |      |      |     |     |     |     |     |      |                |
| <b>Comment</b>          | No   | Yes        | No   |             | Yes          | Yes         | Yes  | Yes  | Yes  | Yes |     |     |     | Yes | Yes  |                |
| <b>Copyright</b>        | No   | Yes        | No   |             |              | Yes         | Yes  | Yes  | Yes  | Yes |     |     |     |     |      |                |
| <b>Uri</b>              | No   | Yes        |      |             |              | Yes         |      |      |      |     |     |     |     |     |      |                |
| <b>Other tags</b>       | No   | Yes        |      |             | No           | Yes         | No   | No   | No   |     |     |     |     | Yes | Yes  |                |
|                         |      |            |      |             |              |             |      |      |      |     |     |     |     |     |      |                |
| <b>Video</b>            | Yes  | Yes        | Yes  | Yes         | Yes          |             | Yes  | Yes  | Yes  | Yes |     |     |     |     |      |                |
| <b>Codec</b>            | Yes  | Yes        | Yes  | Yes         | Yes          |             | Yes  | Yes  | No   | Yes |     |     |     |     |      |                |
| <b>Bitrate</b>          | Yes  | Yes        | Yes  | Yes         | Yes          |             | Yes  | Yes  | Yes  | Yes |     |     |     |     |      |                |
| <b>Aspect</b>           | Yes  | Yes        | Yes  | Yes         | Yes          |             | Yes  | Yes  | No   | Yes |     |     |     |     |      |                |
| <b>Frame rate</b>       | Yes  | Yes        | Yes  | Yes         | Yes          |             | Yes  | Yes  | No   | Yes |     |     |     |     |      |                |
| <b>Encoder</b>          |      |            |      |             |              |             |      |      |      |     |     |     |     |     |      |                |
| <b>Encoder settings</b> |      |            |      |             |              |             |      |      |      |     |     |     |     |     |      |                |
|                         |      |            |      |             |              |             |      |      |      |     |     |     |     |     |      |                |
| <b>Audio</b>            | Yes  | Yes        | Yes  | Yes         | Yes          | Yes         | Yes  | Yes  | Yes  | Yes | Yes | Yes | Yes | Yes | Yes  | Yes            |
| <b>Codec</b>            | Yes  | Yes        | Yes  | Yes         | Yes          | Yes         | Yes  | Yes  | No   | Yes | Yes | Yes | Yes | Yes | Yes  | Yes            |
| <b>Bitrate</b>          | Yes  | Yes        | Yes  | Yes         | Yes          | Yes         | Yes  | Yes  | Yes  | Yes | Yes | Yes | Yes | Yes | Yes  | Yes            |
| <b>Channels</b>         | Yes  | Yes        | Yes  | Yes         | No           | Yes         | Yes  | Yes  | Yes  | Yes | Yes | Yes | Yes | Yes | Yes  | Yes            |
| <b>Sampling rate</b>    | Yes  | Yes        | Yes  | Yes         | Yes          | Yes         | Yes  | Yes  | Yes  | Yes | Yes | Yes | Yes | Yes | Yes  | Yes            |
| <b>Language</b>         | Yes  | Yes        |      |             |              |             |      |      |      | Yes |     |     |     |     |      |                |
| <b>Encoder</b>          |      |            |      |             |              | Yes         |      |      |      |     |     |     |     |     |      |                |
| <b>Encoder settings</b> |      |            |      |             |              | Yes         |      |      |      |     |     |     |     |     |      |                |
|                         |      |            |      |             |              |             |      |      |      |     |     |     |     |     |      |                |
| <b>Text</b>             | Yes  | Yes        |      |             |              |             |      |      |      |     |     |     |     |     |      |                |
| <b>Language</b>         | Yes  | Yes        |      |             |              |             |      |      |      |     |     |     |     |     |      |                |
|                         |      |            |      |             |              |             |      |      |      |     |     |     |     |     |      |                |
| <b>Chapters</b>         | No   | Yes        |      |             |              |             |      |      |      |     |     |     |     |     |      |                |
| <b>Language</b>         | No   |            |      |             |              |             |      |      |      |     |     |     |     |     |      |                |

\*Source: <http://mediaarea.net/en/MediaInfo/Support/Formats>

Table 3: MediaInfo Information Extraction Capabilities by File Type

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### 3.7. Stakeholder Meetings

During the research phase, two meetings were held with potential expert stakeholders: UIUC Library's Media Preservation Specialist, and Illinois Public Media's Director of New Media. The meeting with the Media Preservation Specialist was beneficial in that it started the conversation about what minimum requirements would be appropriate for the standard. Though nothing concrete was established at that time, the meeting established the endorsement of MedialInfo as a primary metadata extraction tool.

Illinois Public Media's Director of New Media provided invaluable practical advice for the development of the standard. As important elements, he recommended: 'Title', 'Description' (narrative or time based as need be), 'Contributors', 'Subject', 'Genre', 'Fixity', 'File Size', and 'File Duration' based on his experience as an administrator of the A/V resources as well as with his involvement in the development of PBCore—a metadata standard widely used in the public broadcasting community. He also emphasized that the rest of the metadata, particularly the technical and administrative metadata could be extracted automatically and again recommended MedialInfo as a preferred tool suggesting that the emphasis not be placed on the technical aspect as this could be easily generated by machine. He further emphasized the importance of capturing digital A/V metadata as close to the time of production as possible by the people who produce it, ensuring that good file naming conventions are in place.

### 4. UIUC Library's New Metadata Best Practice – Our approach

As the target audience for this new documentation is meant to be the general campus community—untrained in the metadata requirements of institutional repositories—it was decided to focus only on metadata element types without stipulating the use of any one metadata schema or standard. This decision was arrived at in part through conversations with stakeholders as outlined above, and also through the anticipation of the needs and abilities of the documentation's target audience. Standards and schemas will be applied to the metadata by the library upon ingestion.

The primary focus of the best practices documentation is centered on the creation of descriptive metadata with an emphasis on 'up-stream capture'—meaning capturing the file's metadata as close to the source of production as possible—and includes recommendations for possible metadata workflows and file naming conventions. A list of required metadata elements is then outlined as follows:

- Title
- Identifier
- File Format
- Date
- Rights Management
- Holding Institution
- Collection Name
- Preservation Level
- Fixity<sup>35</sup>

These required elements were selected as they address both the access and preservation requirements of the library and comprise a basic representation of descriptive, administrative (rights, technical, and provenance), and preservation metadata. A further list of optional elements is outlined in the documentation including:

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35 This element is populated with a checksum generated using a tool such as the Microsoft File Checksum Integrity Verifier (MFCIV) for Windows machines (<http://www.microsoft.com/en-us/download/details.aspx?id=11533>), or the Terminal application on a MAC.

- File Size
- Language
- Publisher
- Subject
- Type
- Relationship

The documentation also includes a list of A/V metadata resources including references to the technical metadata extraction tools as outlined above. The recommended technical metadata extraction tool is MedialInfo for its ease of use and comprehensive coverage and a short tutorial is included showing how to use the MedialInfo tool and discussing its various capabilities including the export of metadata to HTML and .txt files.

The documentation has been kept as simple as possible. Bibliographic jargon has been avoided and concepts and terms have been used and defined to be accessible to the least initiated audience. The goal has been to create guidelines that can be quickly consulted and easily understood. However, more advanced resources have also been included to aid content creators who desire to transform their local metadata to conform to a given standard. These more advanced resources include Extensible Stylesheet Language Transformations (XSLTs) that transform metadata created in Excel into metadata standards, the Metadata Object Description Schema (MODS), the library's descriptive metadata standard for preservation packages, and PBCore, a standard supported by the public broadcasting community.

## 5. Lessons Learned/Conclusion

The importance of metadata is well known. As an institution that is traditionally responsible for bibliographic control, the library has been trying hard to provide best practices and guidelines for metadata creation and resource management. However, the University of Illinois Library has learned that providing metadata best practices and guidelines is different from creating *useful* metadata best practices and guidelines as documents and available resources that content creators outside of the library are aware of and actually use.

While updating and creating new and enhanced metadata best practices for the A/V resources, the library learned that:

1. Metadata best practice documents should be created for content creators, not for librarians, especially not for catalogers and metadata librarians who are trained in bibliographic control and metadata creation. Content creators know their collections and resources, but not metadata standards and library specific terms. As such, documents should use terms that are well known in the community that are familiar to content creators and managers.
2. By the same token, metadata documents should be designed for users who will use them. Instead of introducing metadata standards, it is important to identify what is important for access and preservation. The standard can be introduced as an end product generated by a tool included in the document. That is why the new metadata best practices will include a couple of XSLTs that transform metadata created in an Excel format into MODS and PBCore, so content creators can transform their local metadata to a certain standard when the contents are provided to any service portal for access and preservation.
3. Meeting with stakeholders should be considered when creating metadata best practices. Interviewing stakeholders provides insightful advice based on their practical use cases, which then help to design best practice documents that include key information and structure for users.
4. Outreach planning should also be started when creating metadata best practices. Users often do not know where or whether best practice documents and resources are available. Content creators should be informed where the metadata best practice documents and tools are so that they can get help to create metadata in a more stand-

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ardized and consistent way, which will make their contents more discoverable and increase access. Heretofore, the University of Illinois Library's Metadata Best Practice documents have been available only from the library's Digital Content Creation Unit homepage. But now, the documents are also available from the Metadata Service Unit's webpage with additional resources available inside and outside of campus. For the new best practices, the library is planning to arrange meetings with content creators on campus and workshops for metadata best practices that include hands-on practice and demonstrations of metadata tools and XSLTs.

The University of Illinois Library is responsible for access and preservation of digital A/V resources created and managed on campus. In order to carry out this responsibility, the library tries to provide up-to-date and easy-to-use metadata best practices for content creators, so they can use the documents for creating consistent and quality metadata that ensures both access and preservation of resources for now and in the future.

## 6. Resources

- "AudioMD & VideoMD Technical Metadata for Audio and Video." The Library of Congress. Accessed April 21, 2014. <http://www.loc.gov/standards/amdvmd/>
- "Audio Video Metadata Best Practices." *University of Notre Dame, Hesburgh Libraries*. Last modified August 21, 2013. [http://library.nd.edu/cds/expertise/documents/AudioVideoMetadata\\_Final.pdf](http://library.nd.edu/cds/expertise/documents/AudioVideoMetadata_Final.pdf)
- "Best Practices for Creating Digital Collections." *The University of Illinois at Urbana-Champaign, Main Library*. Accessed April 21, 2014. <http://uiuc-training.libguides.com/content.php?pid=565399&sid=4660118>
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"Metadata Best Practices," *University of Colorado Digital Library*. Accessed April 21, 2014. <https://www.cu.edu/digitallibrary/cudlmetadatabp.pdf>

"Metadata and Digital Video," *JISC Digital Media*. Accessed April 21, 2014. <http://www.jiscdigitalmedia.ac.uk/guide/metadata-and-digital-video>

## THE MUSIC AND SOUND ARCHIVES COMMUNITY OF PRACTICE IN THE PRESTO4U PROJECT

Daniel Teruggi and Luca Bagnoli, Institut national de l'audiovisuel, Paris



Figure 1 – Presto4U Headquarter is located inside the Institute for Sound and Vision's central building near Amsterdam, Netherlands

Presto4U<sup>36</sup> is a two-year European project (started in January 2013) that addresses the issues related to long-term digital preservation in the audiovisual domain and aims to identify useful research results for audiovisual digital preservation through awareness and adoption by technology and service providers as well as media owners.

Coordinated by the Netherlands Institute for Sound and Vision in collaboration with fourteen partners from seven EU countries, the project operates on the understanding of underlying problems related to specific areas of the audiovisual domain. The audiovisual domain has been divided into nine different *Communities of Practice* (Cops), each based on a shared concern, a shared set of problems and a common pursuit of technological solutions related to the custodial practices and preservation challenges in their sector. To this end, the *Institut national de l'audiovisuel* (INA) in France is leading the "Music and Sound Archives Community of Practice"<sup>37</sup>, the only one of the nine communities to deal exclusively with audio.

### 1. Who is part of our community and what for?

The definition of the Music and Sound Archives Community is very large; it involves any collection of sound recordings or media, where the main concern is the audio information. This is not exclusive, since other communities may also contain important volumes of audio contents, but usually actors concerned with this community are:

- Institutions, foundations, or collections where music and sound are the main elements of their activity and form the main objective of their collections;
- Collections within large institutions (like National Archives or Universities) not directly concerned with audio, but where the music and sound collections present a particular interest or value.

36 <https://www.presto4u.eu>

37 <https://www.prestocentre.org/communities/music-and-sound-archives-community-practice>

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This big community is very important at a European level. For the first category, circa 300 initiatives for music and sound have been identified. For the latter, most National Archives and many Museums contain important and rich collections. The common issue is that they all face the same kind of problems regarding their preservation and distribution, and are concerned by the intrinsic value of the sound information. The strong link among all music and sound archives and sound collection owners is the nature and importance of the information conveyed by the collections, and the quality of the sound representing that information. The audio community is quite advanced in some domains, since its storage capacity need is much lower than that needed for video or film and because at a very early stage an uncompressed approach to digital sound recording was established (common sampling rate and bit depth), defining a model that was quickly established as a standard.

Today, music and sound archives have the challenging task of integrating, maintaining, enhancing, and making accessible audiovisual documents. Archiving sound recordings is a problem of vast proportions and not only affects analog media. Even in the digital domain, characterised by endless possibilities for storage and manipulation of the signal, problems exist, inherent to the nature of digital information and the short life of storage devices. We have to remedy the deterioration of media, the loss of data, and the obsolescence of formats and systems.

Our purpose in Presto4U is to identify the various types of problems in music and sound archives, focus on the various issues regarding certified audio storage procedures, find best practices to be adopted in technical environments, and gather information on the size and state of sound recordings preservation initiatives in those institutions that want to safeguard the European audiovisual heritage in diverse and specific fields.

The Music and Sound Archives Community shares many problems with other communities in terms of long-term digital preservation. However, the more specific and crucial issues can essentially be summed up in:

- The unavailability of playback machines for the oldest carriers;
- The possibility of re-access and re-edit of complex musical production environments and work sessions over time, due to the obsolescence of computers, operating systems, software and plugins, and because related information is often missing.

Some perspectives are starting to develop in order to address these issues, which will be presented in this article.

## 2. The world of sound archives

Sound archives that hold audio materials are mostly local and regional archives with mixed collections, but the range is so large that they can span from large dedicated institutions and national public libraries to smaller archives specialising in a particular type of genre, radio material, oral history documents, interviews, and local folk music recordings.

The survey we carried out shows that the audio material present in these archives consists predominantly of open reel tape (almost exclusively under the form of 1/4 inch tape), micro-groove discs (so called “vinyl” or LP), replicated coarse groove gramophone discs (commonly called “shellacs”), instantaneous discs (also known as “direct-cut”, “acetate” or “lacquer” discs), followed by CD-A, DAT, Compact cassette, and the very old phonograph cylinders<sup>38</sup>.

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38 For an analysis of the different types of carriers, read part I of *Audio and video carriers*, Dietrich Schüller. Web version: [http://www.tape-online.net/docs/audio\\_and\\_video\\_carriers.pdf](http://www.tape-online.net/docs/audio_and_video_carriers.pdf)

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In terms of their amount in hours, cylinders and instantaneous discs, which can only hold short recordings, may not constitute a significant portion of the total audiovisual heritage. However, they are generally considered the most at-risk material, due to the fact that they are often unique recordings, and their handling is extremely difficult due to their physical fragility<sup>39</sup>.

Because many archives receive materials some time after they were first produced, obsolete carriers proportionally make up a larger segment within their collections. Archives also have less recent commercially produced material: replicated audio CDs constitutes a significant portion of the total audiovisual holdings, but for the whole audio population, open reel tape is the dominant format.

In most of the cases, the preservation of these materials would be the responsibility of the heritage institution in charge of deposit collections.

The first goal of preservation is to extend the useful life of materials for as long as possible, to cope with the physical deterioration and any external factor that may reduce their life expectancy. For many audio carriers, particularly tape and acetate instantaneous discs, worrying levels of degradation and chemical instability limit life span to decades, and this will be even shorter when deterioration is accelerated by suboptimal storage.

To ensure a longer life to the carriers, we first need to respect the parameters of storage and maintenance, monitor environmental conditions and hygiene of the premises, and plan and carry out periodic inspections to verify its condition. It is clear that this can be achieved relatively easily by setting up an environment with specific microclimate, and in fact most of the consulted institutions have dedicated controlled rooms for the preservation of the old carriers.

Aside from the deterioration of the carrier, what has truly become a commonly perceived threat, perhaps even worse for the future of information retrieval are the obsolescence and the relative lack of availability of original equipment for playback. Maintaining the availability of playback equipment will become an increasingly serious problem<sup>40</sup>.

A further complication is the requirement of having qualified staff able to work with obsolete and obsolescent carriers and playback equipment. Formerly such specialists were often trained in the industry and might have come to work in the heritage sector. Now that production has largely turned digital, these kinds of technicians tend to disappear and leave the place to those who are digital natives and consequently have little if any training in the analogue world. However, this kind of expertise is badly needed, especially in institutions engaged in audiovisual digitisation, as digitisation to archival standards requires optimal signal extraction from the old carriers and hence specialist knowledge of these carriers and equipment.

We must remind ourselves here that the extraction of the signal from the original analogue recording in playback determines the quality of what comes after. If the performance or settings of the equipment are imperfect, this will be at the expense of subsequent steps. The point is that playback equipment is needed in order to realise the digital transfer, as well as expertise to operate the equipment. Moreover, in order to have well-functioning equipment, regular maintenance is recommended, as for instance in the case of tape decks, which must be done frequently so as to not compromise the quality of digital acquisition.

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39 For a strict comparison of durability among various formats, we recommend to consult *Format Characteristics and Preservation Problems Version 1.0* by Mike Casey. Web version: [http://www.dlib.indiana.edu/projects/sounddirections/facet/facet\\_formats.pdf](http://www.dlib.indiana.edu/projects/sounddirections/facet/facet_formats.pdf)

40 Dietrich Schüller, *Audiovisual research collections and their preservation*. Web version: [http://www.tape-online.net/docs/audiovisual\\_research\\_collections.pdf](http://www.tape-online.net/docs/audiovisual_research_collections.pdf)

The devices utilised by the institutions are, in almost all cases, professional or semi-professional ones, especially as regards to tape decks (Studer is still the leading brand), whilst phonograph turntables are predominantly consumer types with some exceptions in larger institutions.

In short, requirements in terms of equipment and technical expertise, particularly on analogue carriers and playback equipment, are such that many institutions are struggling with this. It is obvious that the transfer to a digital format is seen as a good solution, but given the inadequate technical infrastructure some archives face, they would have to find ways of outsourcing this transfer to external experts.

The strong point concerning the Music and Sound Archives Community, is that from a technical point of view, it is a quite structured one: common technical choices and procedures are widely spread for traditional material<sup>41</sup>, it is then important to concentrate on new issues regarding the evolution of the Community and the implications of this evolution from a preservation point of view.

### 3. The world of Music Archive

Two types of music archives are identified:

- Music archives only concerned with the preservation of musical recordings, in which case they share exactly the same problems and issues of the Sound Community;
- Music archives directly related to production, which present a general preservation problem due to the complexity of the production environment and the economical implications this may have for their activity.

Different actors are concerned:

- Classical recording companies or studios working for them;
- Popular recording companies or studios working for them;
- Contemporary Electroacoustic production centers and universities.

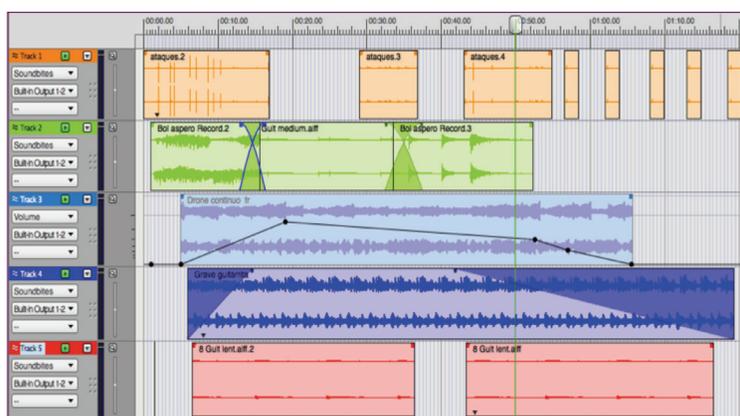


Figure 2 – Image of the mixing window of a sound sequencer. Each track contains one stereo sound. Sounds can be segmented, repeated, superposed, controlled in intensity (track 3) or with initial and ending fades (track 4). The resulting file can range from a mono file to any number of files; linked among them or separated. In this simple example with only 5 different audio-files, the software (Digital Performer) has created 59 files associated to the session.

41 One for all, IASA-TC04 is widely considered as the reference in terms of audio preservation guidelines. For more information: <http://www.iasa-web.org/tc04/audio-preservation>

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Production tools are complex and imply the management of hundreds and even thousands of sound files, which are regularly produced in musical recordings, editing, and post-production. These production tools generate a complex array of documents containing the final result of a production or, as currently named, a “mix.” Mixes can be tape-based (2-inch audio-tapes containing up to 24 different tracks or 1/2-inch digital tapes containing up to 48 tracks) or totally digital, in the form of a series of folders and files. When a production is finished, it is stored either as a tape (in old days)—and nowadays often as a hard disk containing the production—or as an LTO replacing the disk at the end of the production. The preservation process for these production environments is the same as with any audio content, however files contain not only sound-files, but also many other different types of files, strictly dependent on proprietary software that may evolve or even disappear. This use-case is extremely important in the music industry domain, since “mixes” are “remixed”, which means that a new version of the same work may be issued in the future with a rearrangement of the sound-files or even an inclusion or replacement of existing instruments by different ones. It is then important to keep the integrity of the original mix and to be able to access it within the fast-changing technology environments; and it is equally important to be able to understand how the mix was done and structured in order to easily access the numerous sound files and change any component or aspect of it. These production environments are not hierarchically structured, so it is the sound engineer who freely organises the structure and generally keeps the structure knowledge to himself; thus complicating any further access.

To summarise the encountered problems:

1. **Software incompatibility:** mixing session files are proprietary files dependent on a commercial software company. New versions and subversions are issued regularly bringing new functionalities or adapting to changes in the operating systems. The main issue here is backward compatibility, which is normally assured on an N-2 version. However if there are major breaking changes in technology, this may be shorter. Often features from a previous version are lost or not compatible with existing versions.
2. **Incompatibility of associated software:** mixing sessions often contain plug-ins for sound processing or enhancement, which act in real time on the sound and the result only exists during the playback unless a specific copy of the result is done on a new audio file. Incompatibility issues are much stronger here, mainly when plug-ins of different companies are put together on the same mixing session. Plug-ins also contain settings, which are memorised as independent files; the setting files correspond to a precise version of the plug-in. This implies that alongside with the mixing session, all the necessary plug-ins need to be kept multiplying by an important factor the risks or obsolescence. The main problem in such a complex environment is that the slightest incompatibility may result in a loss of the session for further reuse.
3. **Knowledge associated to the session:** Mixing sessions are done by operators knowing well the functioning of the session and having the skills of sound engineers. They construct the mixing session in function of the context, structure them on their habits and experience, and establish internal hierarchy depending on the nature of the music and of the project. The operator has knowledge of the session, which belongs to him and is not transmitted except on rare occasions. When a mixing session is re-opened for some reason, if it's the same operator, he may recognise the hierarchical patterns he laid down for the session; however if it's a different operator, he will have to go through the entire session in order to try to understand where the sounds are on the timeline to achieve the final result. In many cases remixes are abandoned due to the complexity of understanding the underlying pattern of the mix.

### 3.1. Preserving the production environment and the knowledge associated

Two different problems arise then: preserving the mixing session with all its components and preserving the logic and steps that led to it. The first is a technical preservation issue; the second one is a documentation issue.

There are some initiatives for an exchange format called Open Media Framework (OMF) or Open Media Framework Interchange (OMFI), which is a platform-independent file format intended for transfer of digital media between different software applications, however it eliminates an important amount of associated data and permits mainly to transfer sound-tracks from one environment to another.

There may be some cases which are still more complex, in which a specific software, device or machine is needed to reproduce the production. This may imply software developed for the occasion or a series of parameters, which need to be preserved in order to produce the same results.

Independent of the preservation of the elements composing a musical work, there is all the contextual knowledge, which needs to be recovered and associated to the production environment. These can be considered primarily as metadata, however it often implies information that is kept by users or practitioners. Sound engineers, musical assistants, or the composer himself often keep essential information necessary to bring the production's components back together in order to reproduce the same music.

Some initiatives have been launched in order to analyse and describe the necessary elements that should be collected and kept in order to organise preservation in such a way that permits re-creation in the future of a contemporary production. Among them, the MUSTICA project (developed in 2004–2005 by Ircam, GRM, and the University of Technology of Compiègne in France and by the University of California, Los Angeles in the US) describes a methodology any music creator should use if he wishes to assume a complete description of his work. The main objective is not only to preserve the constitutive elements, but all the information and knowledge needed to re-perform the work or to make a new mix of it.

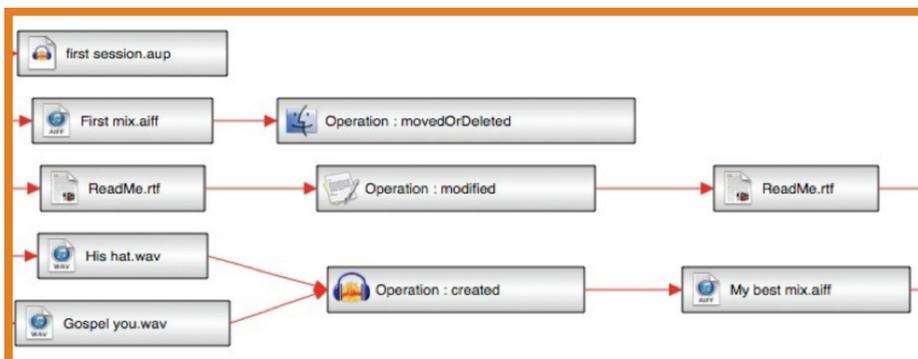


Figure 3 – Image of the File-tracker developed by the Gamelan project where a structured timeline of all the actions is kept and enriched easily by the operator

More recently, the CASPAR and GAMELAN projects have addressed the problem at different levels, in order to analyse the situation from an OAIS basis for the first one and to develop a specific production tracker environment for the second one, which will allow the collection of information during the production process.

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#### 4. Conclusions

For the sound archive community, as said earlier, the situation is quite clear and there are important literature<sup>42,43</sup> and publications<sup>44</sup> concerning digitisation, quality, and preservation. There are no major issues concerning the preservation of sound itself. Digitisation of audio carriers has been done for a long period of time and the formats and methodologies are clearly established.

However a major unsolved issue was encountered with the preservation of music production recordings, for which no substantial action has been undertaken and the major production centers for classic, contemporary, or popular music face the danger of losing most of their collections due to complex preservation environments and lack of descriptive information permitting the understanding of the preserved contents. It is important to aggregate a large amount of content holders from musical production and share some of the already existing outcomes. Some European projects such as FP6 CASPAR<sup>45</sup> and the French ANR project GAMELAN<sup>46</sup> have dealt with these issues and are starting to propose partial solutions. Presentations of these findings are expected to be given in international conferences, such as the EMS conference<sup>47</sup> in Berlin in 2014, which is dedicated to specialists of contemporary musical production.

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42 *Sound directions: best practices for audio preservation* by Mike Casey, Indiana University and Bruce Gordon, Harvard University, 2007. Web version: [http://www.dlib.indiana.edu/projects/sounddirections/papersPresent/scd\\_bp\\_07.pdf](http://www.dlib.indiana.edu/projects/sounddirections/papersPresent/scd_bp_07.pdf)

43 *Manual of analogue sound restoration techniques*, Peter Copeland, The British Library, 2008. Pdf version: <http://www.bl.uk/reshelp/findhelprestype/sound/anaudio/analogue-sound-restoration.pdf>

44 The *Association for Recorded Sound Collections Journal* is a semi-annual publication that serves to document the history of sound recording and includes original articles on many aspects of research and preservation

45 <http://www.casparpreserves.eu/caspar-project.html>

46 <http://www.gamelan-projet.fr/co/accueil.html>

47 <http://www.ems-network.org/ems14/index.html>

## THE AUDIOVISUAL RESEARCH COLLECTION FOR PERFORMING ARTS (ARCPA) AT UNIVERSITI PUTRA MALAYSIA: NEGOTIATING ETHICAL ISSUES IN SOCIAL SCIENCES

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The paper introduces the history of the Audiovisual Research Collection for Performing Arts (ARCPA) and its relevance to the Universiti Putra Malaysia (UPM) and to the recognition of intangible knowledge represented in creative arts. Some challenges of ARCPA's actual situation as well as concrete outcomes from the viewpoint of the recordist, the researcher, and the archivist will be discussed. Further, the team wants to promote the idea of implementing basic knowledge on archiving procedures and principles into undergraduate and graduate studies across Southeast Asia in order to increase awareness towards media sensibility and responsibility regarding audiovisual documents used in research and serving the collective memory of the communities concerned.

Each viewpoint contributes another perspective on the same task and may stimulate a differentiated approach to specific needs in the process of collecting, preserving, maintaining, and giving access. The paper will help to clarify the roles and profiles of different users and participants in the archival process.

### 1. History and Actual Situation of ARCPA

In 2011, a group of researchers at the Faculty of Human Ecology of Universiti Putra Malaysia started 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. 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 since the main idea is to re-use and to effectively exploit existing audiovisual documents for research and educational purposes.

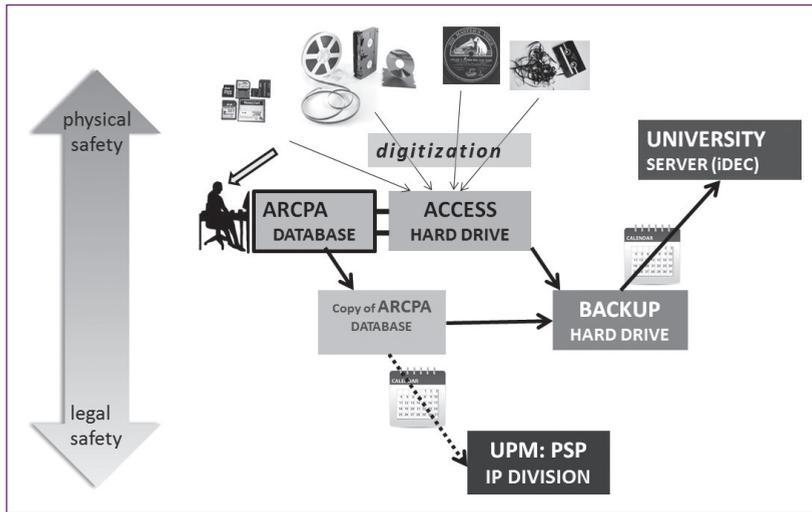


Figure 1: Archiving workflow from the collector/recordist conducting entries in the database while controlled copies are made (with/without digitization) that are stored parallel on two hard drives that are regularly backed up within the university server. The database is copied regularly to the university's Intellectual Property Division to prevent manipulation.

So far, the project may be called successful by the music department and the entire faculty that is home to humanities and social sciences, who increasingly involve audiovisual tools in their research projects. But this was not automatically the case.

Being engaged in audiovisual archiving over decades, it was quite strange to be forced to explain the usefulness and the importance of audiovisual archiving to colleagues who are supposed to be of a similar educational level. However, also being trained in anthropology and cultural studies, we should not be surprised that the actual conditions of tertiary education in Malaysia are complicating a holistic understanding of knowledge sources.

The history of various cultures in place, their mutual relationships that are characterized by parallel rather than interchanging communication (Jähnichen & Meddegoda, 2013) and the post-colonial approach to tertiary education challenge an effective implementation of basic audiovisual archive principles.

To be specific, we struggle with the following conditions regarding the general understanding of audiovisual archiving: A strict difference is made between 1) a publication endorsed by a higher authority such as an approved publishing house and 2) providing access to audiovisual documents. The first seems to be praiseworthy, the second suspicious. When asking about offering AV archival service to a wider clientele within the university, the question often bounced back to us: "Who gave you permission to store other people's things in your archive?" Obviously, the self-determined care about what happens to one's own documents and the recordings of performers and musicians seems to be an alien concept to a number of academics who might be accustomed to blindly follow general procedures of reporting outcomes. The observed unwilling response to audiovisual archiving of research documents indicates, on the other hand, that individual responsibility for outcomes is not in the scope of research. By publishing papers through a publishing house it is believed that a part of responsibility for contents and layout is delegated to the approving body, which could, in return, scare editors and publishers. On the other hand, the insight that grant funded projects and their results are not owned by the project leaders is partially new since knowingly it was only applied on purchased equipment. For many colleagues and subsequently for their students, a sense of responsibility towards research tools, audiovisual resources, documents, and finally towards an increasing knowledge

in a research field is rarely the norm. Thus, audiovisual archiving in academic environments is like starting a vegetarian restaurant on a buffalo ranch.

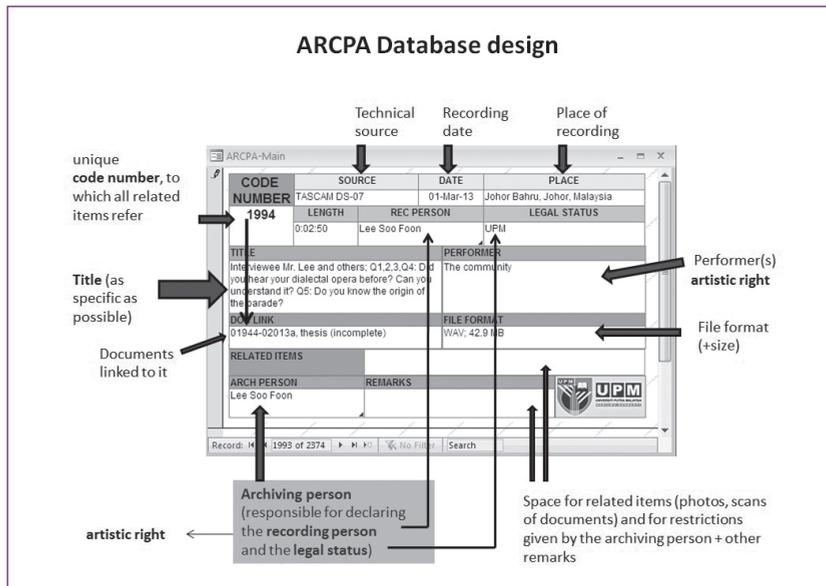


Figure 2: Data sheet for collectors, who conduct entries under the guidance of an archivist. Further manipulation of entries is excluded through immediate back-up copies stored on a separate data carrier that is controlled by the IP division of UPM.

Another problem is the ignorance of those who deliver a critical piece of knowledge at both ends of any research process. During collecting data, musicians or other performers as well as the audio and visual conditions of their practice, are often insufficiently documented given the common habit not to ask odd or other personal questions (Jähnichen, 2014). While working on a publication, the participants are rarely informed or asked for final comments. This common habit makes collecting, maintenance, preservation, and providing access extremely vulnerable regarding both physical and legal safety.

Our main task remains, therefore, taking up the challenge not only to archive audiovisual documents without compromising technical and legal standards but to educate ethically in paying respect to all participants in the process of gaining knowledge and finally to the outcome itself. The key goal of any archiving activity (Edmondson, 2004) is providing access that allows for re-use, learning, and teaching.

## 2. Quality Recordings for Research Archives

At the root of all audiovisual collecting efforts are the recordings. Here is an example of how a manual for recordings can be designed, especially for social scientists, which are the main users of the archive.

First, a recording team has to be composed. Each team member should be able to conduct all necessary working tasks. However, in an actual case, each member has to focus on the best possible quality of his or her special area that might be different from case to case. To achieve good coordination, any work has to be based on joint agreement and well defined communication modes. Essentially, a number of decisions have to be made by the recording team on the equipment in its best possible effectiveness, though a low budget environment sets some limits. One important concern is, for example, the choice of microphone types according to the type of sound source (see figure 3). The decisions have to be made mostly on the spot and are de-

manding in terms of flexibility within the team. The methods for decision-making and the final production process have to be articulated in the documentation<sup>48</sup> that includes related items such as reports and subsequent research papers (Musib, 2012a, Musib 2012b).

The recording procedure does not end with choosing the right equipment and the positioning of microphones. In course of experiences with this part of the collection, recordings of narratives, of unaccompanied songs, of music ensembles accompanying singing, and of instrumental music within an environmental setting that fits most to its cultural repertoire have to be differentiated (Bradley, 2008). For example, considering low budget recordings but high demands, music ensembles accompanying singing may be recorded best through

- a stereo pair with 3:1 ratio position
- signal level monitoring for balance of ensemble and singers
- sampling rate of at least 16 bit 48kHz or, if the disk space is ample, a user may select 24bit 96kHz.

While using a portable digital recorder, recordists should be aware of ALC (Automatic Loudness Control), a built-in audio signal compressor that attenuates loud signal from over modulating of a signal or distortion at the input signal; and AGC (Automatic Gain Control), a built-in device that serves as a “hands on the knob” function, keeping the correct as well as ideal signal level seen from the perspective of standard audio engineering.

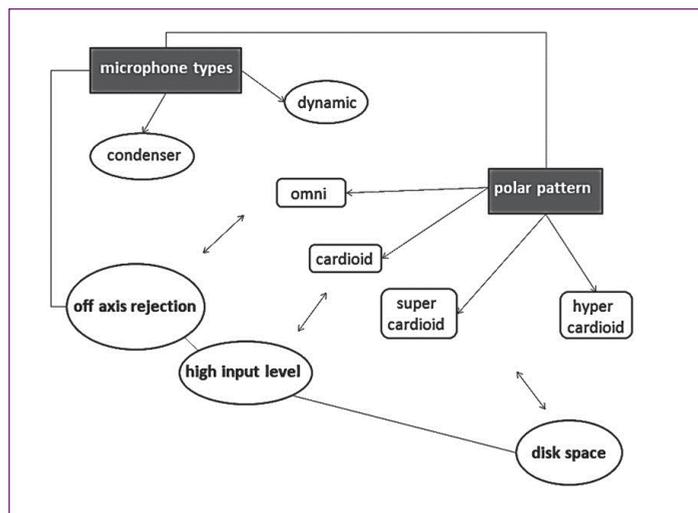


Figure 3: Decisions to be made on the spot in order to achieve high effectiveness in a field recording process.

Another example is recording in a holistic approach that offers alternatives of perception modes as it gives a choice of how the event might have been experienced. As described in an earlier study (Jähnichen & Musib, 2013), the microphone consideration focuses in most cases on the core source and the source might contain multiple radiators such as drums, strings instruments, other sound radiators such as accessories worn by the dancer, and sound activities and occurrences in the surrounding. A ‘contextual sound’ microphone setting requires

48 Bradley (2009) pointed out regarding effective preservation that this process involves consideration of historical values, their content, as well as archiving a format that can be reprocessed in an apparatus which does not alter its originality. In this context, the entire workflow should be considered part of the audiovisual documents. However, in low budget environments, special systems that encode relevant information into the primary preservation object are still not affordable.

sound mapping that draws the attention of the listener into understanding from which angle he or she listens to. To achieve this it is necessary to obtain the overall signal level by using the sound meter. If a stereo microphone is needed, a signal monitoring technique has to be applied to find the most suitable spot for placing the microphones. Again, the sampling rate should be at minimum of 16bit with 48 kHz or, if the disk space is ample, one may use 24bit with 96 kHz (Bradley, 2009).

Despite all technical efforts that must be based on cultural information on the event to be recorded, it is important to treat the sound as knowledge (Wightman and Jenison, 1995) which is not limited to only an instrument and musicians. The sound environment should also fall in the picture of an archivist and should be documented in equal quality to the content description (Wightman & Jenison, 1995). Taking field notes on recording matters is of the same importance to the archiving process as photographing the recording situation, spatial layout, and special parts of the equipment.

### 3. User Cultures

Seen from the other end of the archiving process, though some users and enthusiastic collectors are already working hard on it, a wider user community has to be introduced into the various functions of the archive and to be educated in terms of amplifying the effect of the archiving process. To promote the archive, the main advantages from the viewpoint of the 1) performers, 2) recordists, and 3) the researchers have to be clearly explained and made visible.

Ong Thwee Cheen uses this reference model in his thesis:

“He feels that authenticity of the stories in the lyrics is crucial and plays an important part in the music. It has to come from personal experiences, clear understanding of other people’s experiences and what the musicians genuinely feel from inside themselves” (Meng, 2013: ARCPA1320, 0:12:40-0:12:50).

An interview recorded with a musician, citing him and using the time code of the recording (replacing ‘page number’). The full entry is traceable on site + database extract of used recordings is in the appendix.

| CODE NO | DATE       | PLACE                           | SOURCE     | LENGTH  | REC PERSON | LEGAL STATUS | TITLE                                  | ARCH PERSON | PERFORMER | FILE FORMAT |
|---------|------------|---------------------------------|------------|---------|------------|--------------|--|-------------|-----------|-------------|
| 1320    | 08/03/2013 | Damansara Perdana, KL, Malaysia | Zoom Q3 HD | 1:36:10 | Frank Ong  | UPM          | Interview with Meng - Indie Rock Music | Frank Ong   | Meng      | MOV; 1.4 GB |

Figure 4: How audiovisual documents serve as reference material. Through linked documents, more information can be traced about the performer.

One good and convincing strategy to attract researchers is acknowledging them the possibility to integrate audiovisual documents as reference material in their publications. Also, researchers in many tertiary educational institutions can claim recordings and their documentation as counts for their productivity index. Graduate students are pioneering in this function and have shown in a number of theses and editions that the reference system is of advantage for both researchers and performers, who are recognized in an academically satisfactory way for the first time. Previous publications on anthropological or ethnomusicological issues suffered often from insufficient data provided such as “a musician A in village X” or “an informant B in Y street of Z town at the beginning of the 20<sup>th</sup> century.” Even if more precise data were given, they were presented in a “zoological” manner (Jähnichen, 2014) mentioning age, gender, race, and body characteristics (such as “small, pink skinned, nearly bald, with white moustache”) before getting to the professional skills and the performance offered in a way that respects the personality of the performers in giving an account of the event and the contents of the performance with

reference to the performers' or their descendants' contact details. In this way, when database entries are requested, self-servicing collectors as well as users are forced to rethink their interactions with the participants of the recordings (Seeger, 1996).

Another important tool in promoting the functions of audiovisual archiving for research in social sciences is the assurance of not exploiting the material commercially without providing security control mechanisms. The commonly displayed fear for loss of control of audiovisual documents seems ridiculous in the context of print publications, of which nobody is ever able to know all readers. Nevertheless, there is still a perception that the partners with whom one is going to share knowledge must be approved by an authority.

As observed, resentments towards any collection of information in the world of research derive from bad experiences in natural sciences with authorship infringement following the stealing of research data. This general bias is hard to overcome although in social sciences, looking at the diversity of items that might be found in the database (see figure 5), such incidents rarely occur or may not occur at all. Nevertheless, the theoretical possibility is often taken as an excuse to avoid archiving procedures or to delay the lifting of access restrictions (Schüller, 2008; Seeger, 1997).

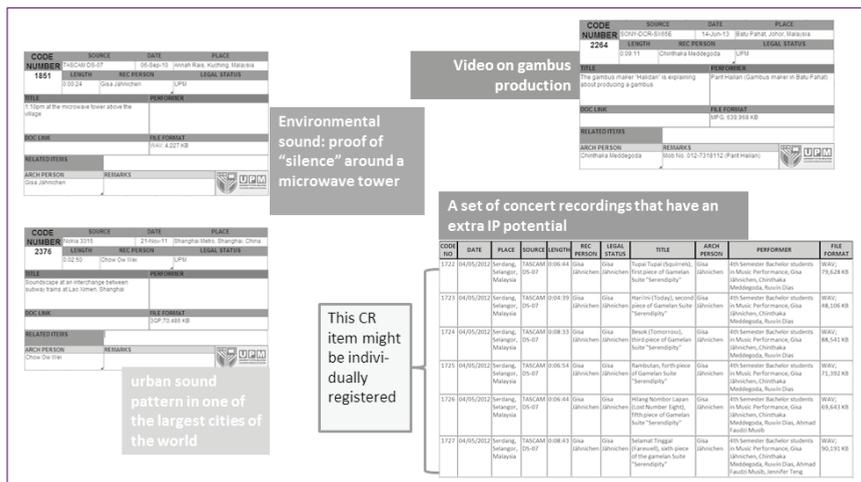


Figure 5: Diversity of audiovisual documents stored and maintained in ARCPA. Most of the documents do not serve further exploitation as IP items of the university. However, copyright and legal status is clearly stated.

Also, a widespread misconception is the assumption of not being able to control one's own rights from the moment in which the data are stored in an archive. This applies also if the original data carriers are not handed over. This fear derives partly from ingrained social experience in being detached from decision making regarding laws and their applications. It is a culturally rather than an individually patterned perception of participation in an interactive process. Still in search for ideas how to turn this perception into pro-active participation and in promoting knowledge access, ARCPA has designed a webpage to provide all necessary information on various archiving tools and subsequent control options. To give an example of the challenge, this website has not yet been approved and endorsed by the department's leading group since there are supposedly still pending questions of integrity to be answered.

Another point in promoting the archive is the design of its outer appearance. Since a digital archive does not look like a conventional audio and video library with nicely labeled items on shelves, students who might be open to its functionality are not much attracted by its unexciting look. However, original carriers that have been digitized, have to be stored in an envi-

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ronmentally safer place than the entry and access point of the archive. Therefore, a few items such as duplicates of recordings or replay units, musical instruments, and audio equipment are exhibited in order to attract larger groups of beginners in the academic world.

#### 4. Final Remarks

Many details have to be improved further, such as the ability to include entries in the database that should not be fully accessible to all users. Until now, in order to provide the most transparency possible, ARCPA has worked with only one interface to the database. This might be changed in the future.

One of the most burning tasks is the integration of audiovisual archive principles in as equal a way as library information has been integrated into undergraduate and graduate studies of tertiary educational institutions. Only long-term training of all potential “stakeholders” may help to face the growing importance of audiovisual documents in the future of research and education. How this training might be designed depends strongly on cultural conditions as the case of ARCPA shows.

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## FEAR AND CONTROL IN A ROCK N' ROLL ARCHIVE

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Like oil and water, rock music and libraries appear insoluble. Libraries are quiet. Rock is loud. Rock seems to stand in opposition to hierarchy and order. Libraries embrace both. In what follows, I describe my attempt to bridge this divide by making an archival rock music collection accessible in an academic library setting. It is a story of born digital collections, born digital fans, rights-related entanglements, and how sublimating discourses regarding libraries, archives, and music commodification collide with fandom and the reality of making such an archival collection available in a library-only setting.

### I. About the Croc

Seattle's Crocodile Café (aka, The Croc) is a legendary rock music venue in the Pacific Northwest (NW) of the United States. Founded by Stephanie Dorgan in 1991 with her husband Peter Buck (of REM fame), the Crocodile Café quickly became a cornerstone of Seattle's rock scene, a place where both up-and-coming and well-established acts performed in what many considered to be the best sounding room in town. During the early 1990s the Crocodile played a key role in fomenting grunge's explosion by showcasing such bands as Mudhoney, Pearl Jam, Alice In Chains, Tad, and Nirvana. As NW music historian Peter Blecha notes,

Particularly legendary nights there include the (\$3) Mudhoney show on October 4, 1992, when attendees expected to see some unknown band promoted under the silly name of "Pen Cap Chew" also perform, only to experience the surprise of their life when the then-most-famous band on planet Earth take the stage. So stunned were they by Nirvana's arrival that the ritual mosh-pit frenzy reportedly gave way to gaga staring and rapturous ovations.<sup>49</sup>

By the mid 1990s grunge fizzled, became post-grunge, and was superseded by Britpop. However even as tastes changed, the Crocodile endured and became a vital steppingstone for a new generation of Pacific NW bands. Many were obscure and unknown, but a few went on to some fame, including Modest Mouse, Decemberists, Built to Spill, Death Cab for Cutie, and Harvey Danger.



Jim Anderson at the Crocodile Café circa 2007 (Photo by Thomas James Hurt)

<sup>49</sup> For a fuller history of the Crocodile Café, see Peter Blecha's article: [http://www.historylink.org/index.cfm?DisplayPage=output.cfm&file\\_id=8448](http://www.historylink.org/index.cfm?DisplayPage=output.cfm&file_id=8448)

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It was in 2002, during this new wave of NW bands, that the Crocodile's sound engineer Jim Anderson began to record each live performance. In addition to mixing live sound he plugged his laptop into the board and captured 16-Bit/44.1 kHz AIFF files from each band's show. He complemented the stage mix with ambient sound from microphones placed over the audience, thus giving the recordings a truer sense of place.<sup>50</sup> Why did Anderson do this? He was mainly inspired by a desire to document the scene as it was happening. He lamented all of the missed opportunities there have been throughout the last century to record key moments in popular music history. He did not want to be a part of that sad legacy. Anderson was also motivated to record out of a sense of technical curiosity. As he told me, "I wondered if I had the tools in-house to make a recording and then burn a CD that I could give to a band immediately after they finish playing."<sup>51</sup>

For five years Anderson methodically recorded and saved every performance. This resulted in a trove of some 3,000 hours of recordings, two terabytes of data, or over 5,000 individual audio files (each file usually representing one band's set). The recordings documented performances by thousands of artists.<sup>52</sup> From indie rock to punk, freak folk to noise, Americana to hip-hop, and (of course) post-grunge to Britpop, the collection reflects a cross current of popular music in the US in the early 21<sup>st</sup> century. And whatever ones opinion of a particular band or genre, the crystalline and resounding quality of the recordings is a testament to Anderson's audio engineering prowess.

## 2. Permission and Restriction

When the Crocodile unexpectedly closed in 2007 Anderson was left holding this phenomenal cache. It was backed-up on CD-Rs and external hard-drives, tucked away in his closet. However, he wanted the collection to endure and be made accessible in a library where scholars could access it for research and study. We made contact with one another and began having conversations about donating the collection to the University of Washington (UW) in Seattle. There was just one catch: he did not have permissions from any of the bands represented in the collection.

Why not? Wouldn't it have been ethically sound for Anderson to have asked for consent from the artists before recording them? Perhaps, but he thought posing this question before they took to the stage might disrupt their focus on the live performance. Instead he recorded the bands without their knowledge and when they were finished he would let them know, asking if they would like to buy a CD recording of their performance. He did not charge much; just enough cover his CD-R costs and perhaps a bit of gas money. Outrageous? Not according to Anderson. The bands' responses were overwhelmingly positive to his query and, in fact, truly grateful to have one of the most respected live sound engineers in Seattle record them for next to nothing.<sup>53</sup>

Despite these rights related concerns we moved ahead with the donation to UW in October 2008. To allay concerns some had in the UW Libraries about the "no permissions" nature of the collection, Anderson's original files were donated to Dr. Laurel Sercombe at the UW Ethnomusicology Archives. We in the UW Libraries then took on the responsibility of backing up and making the files accessible. With help from Rachel Adams and Cydne Danielle Zabel, two UW library school graduate students, we created MP3 access copies from the original

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50 To make the recordings Jim Anderson ran the board feed into a small Behringer mixer; then into an external A/D converter; and finally into his Apple iBook, 500 mhz G3, running OS 9.2.2. He used direct-to-disc audio recording freeware called Coaster to capture the sound.

51 Personal conversation with Jim Anderson, October 2009.

52 A list of bands and artists represented in the collection can be found here: <http://guides.lib.washington.edu/content.php?pid=210181&sid=1770394>

53 Some artists appreciated Anderson's recordings so much that they released them commercially. See, for example, Camper Van Beethoven's CD "In the Mouth of the Crocodile."

AIFF files and added them to a shared iTunes application. The students then populated the iTunes fields with artist names, performances, and other core information. MARC compliant? No. AACR2 obedient? Definitely not. Did it work? Yes.

**\*Media Center - Crocodile Cafe** ▶ 

5134 items, 124.6 days

| Name                                      | Time    | Artist           | Album                                   |
|---|---------|------------------|---|
| Death Cab for Cutie   2/3   2003-09-29    | 29:37   | Death Cab fo...  | 2003-09-29   Death Cab for Cutie   2/3  |
| Death Cab for Cutie   3/3   2003-09-29 ▶  | 8:34    | Death Cab fo...  | 2003-09-29   Death Cab for Cutie   3/3  |
| The Long Winters   2003-09-29             | 53:43   | Long Winters...  | 2003-09-29   The Long Winters           |
| New American Standard   2003-10-01        | 35:40   | New America...   | 2003-10-01   New American Standard      |
| New American Standard   2003-10-01        | 35:40   | New America...   | 2003-10-01   New American Standard      |
| Amazombies   2003-10-02                   | 32:09   | Amazombies       | 2003-10-02   Amazombies                 |
| Gina Gershon   1/2   2003-10-02           | 39:52   | Gershon, Gina    | 2003-10-02   Gina Gershon   1/2         |
| Gina Gershon   1/2   2003-10-02           | 39:52   | Gershon, Gina    | 2003-10-02   Gina Gershon   1/2         |
| Gina Gershon   2/2   2003-10-02           | 13:09   | Gershon, Gina    | 2003-10-02   Gina Gershon   2/2         |
| Gina Gershon   2/2   2003-10-02           | 13:09   | Gershon, Gina    | 2003-10-02   Gina Gershon   2/2         |
| Los Halos   1/2   2003-10-03              | 45:26   | Los Halos        | 2003-10-03   Los Halos   1/2            |
| Los Halos   2/2   2003-10-03              | 7:37    | Los Halos        | 2003-10-03   Los Halos   2/2            |
| March Lions   2003-10-04 ▶                | 19:38   | March Lions      | 2003-10-04   March Lions                |
| The Protocol   2003-10-04                 | 35:45   | Protocol, The    | 2003-10-04   The Protocol               |
| Black Nite Crash   2003-10-05             | 33:24   | Black Nite Cr... | 2003-10-05   Black Nite Crash           |
| Lake Trout   1/2   2003-10-05             | 1:03:56 | Lake Trout       | 2003-10-05   Lake Trout   1/2           |
| Lake Trout   2/2   2003-10-05             | 9:29    | Lake Trout       | 2003-10-05   Lake Trout   2/2           |
| Mellowdrone   2003-10-05                  | 35:25   | Mellowdrone      | 2003-10-05   Mellowdrone                |
| Jodi Hates the World   2003-10-07         | 30:51   | Jodi Hates th... | 2003-10-07   Jodi Hates the World       |
| Slomo Rabbit Kick   2003-10-07            | 31:51   | Slomo Rabbi...   | 2003-10-07   Slomo Rabbit Kick          |
| Electric Kisses   2003-10-09              | 21:22   | Electric Kisses  | 2003-10-09   Electric Kisses            |
| Some Girls   2003-10-09                   | 1:13:28 | Some Girls       | 2003-10-09   Some Girls                 |
| The Pieces   2003-10-09                   | 41:43   | Pieces, The      | 2003-10-09   The Pieces                 |
| Brent Arnold and The Spheres   2003-10-10 | 41:01   | Brent Arnold...  | 2003-10-10   Brent Arnold and The Sp... |
| Hella   2003-10-10                        | 46:49   | Hella            | 2003-10-10   Hella                      |
| Quasi   1/2   2003-10-10                  | 57:11   | Quasi            | 2003-10-10   Quasi   1/2                |
| Quasi   2/2   2003-10-10                  | 27:20   | Quasi            | 2003-10-10   Quasi   2/2                |

Screenshot of the Crocodile Café Collection's iTunes interface.

Again, due to rights related concerns, none of the recordings were originally made available online. Instead they were only made available via a pair of dedicated computers within the environs of the UW's media library. In order to reduce the ability of users to make unauthorized copies of the recordings, we set the monitors and the computers behind glass and funneled headphones, keyboards, mice, through a hole in the wall. All programs on the computer other than iTunes were disabled. No Internet browsers were made available and the files were streamed to the computers so they could not be easily downloaded or saved to an external device. In other words, fans and researchers who wanted to listen to the recordings could do so (the library is open to the public), but they needed to do so in the library and via one of these listening stations.

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### 3. Reaction and Resentment

When Jim donated the collection to UW, one or two local press outlets wrote short, positive stories about the gift.<sup>54</sup> Therefore, when we made it accessible to the public ten months later, I expected more positive reactions. After all, we were making these recordings freely available to anyone who came in to the library. In order to collect what I thought would be an effusion of library accolades, I set up a Google Alert for “crocodile café collection” so that every time that phrase was posted online I would receive an email notification with a link back to the source.

The Google Alert worked as planned, but the tone of the netted posts caught me off guard. Despite a few positive blog posts about UW Libraries making the collection available, the overwhelming reaction from readers who commented on the posts, and from fans communicating in online music forums, was *negative*. Yes, people loved the collection, but the fact that it was offline and only available in a library made many so frustrated that they openly outlined how they planned to steal the recordings. For example, despite an upbeat post about the donation at Seattle’s Metroblogging website, “Josh” comments:

Searching through the near-encyclopedic list of the thousands of hours of footage induces feelings of joy and dread at the prospect of being able to re-listen to some of my favorite shows I saw at the Crocodile at the expense of listening while being strapped to a pair of headphones under fluorescent lights.<sup>55</sup>

Other sites were peppered with similar grumblings, but by far the most productive site for disgruntled commentary about the donation was harveydanger.com, the band Harvey Danger’s discussion list and fan website.<sup>56</sup> While “joedecarolis” offers a (somewhat salty) expression of excitement about the collection (“HOLY FUCKING SHIT, it would make my life if I had a copy of [those recordings]”<sup>57</sup>), most of the commentary is rooted in displeasure with the archival and in-library-use-only nature of the collection. Many fans even go so far as to propose ways in which to hack into the collection and steal it.

According to the website, they’re all loaded onto iTunes.... I’ll bet somebody could burn them to disc ... or e-mail them to themselves, and work out the hacking-into-them bit later. Clearly it would be most-awesome if somebody in Seattle could give that a go. ;-) But if not, then when we’re all in Seattle for the last shows. Sunday. If somebody can get me into the UW library and logged into one of the media center computers, I can see what sort of tricks I can pull.... I’m not an old pro at this sort of stuff, but I definitely have enough amateur experience to give it a try.<sup>58</sup>

Someone else offers to pay for the files if they are successfully stolen:

If anyone is actually going to try to go steal some of these shows, please let me/us know – id have a few small requests outside of the obvious Harvey Danger and related shows..and id (sic) gladly pay you for your troubles.<sup>59</sup>

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54 See, for example, this short piece in the Seattle Post Intelligencer:

[http://seattletimes.com/html/matsononmusic/2009641098\\_crocodile\\_engineer\\_jim\\_anderso.html](http://seattletimes.com/html/matsononmusic/2009641098_crocodile_engineer_jim_anderso.html)

55 <http://seattle.metblogs.com/2009/08/07/live-from-the-croc-listen-on-aug-11/>

56 See the following harveydnager.com thread about the Crocodile Café Collection:

<http://harveydanger.com/bb/showthread.php?tid=2288>

57 *ibid.*

58 *ibid.*

59 *ibid.*

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Another fan openly wonders if it is normal for him “to scope out the media building at night or put on camouflage while reading blueprints and schematics of the building.”<sup>60</sup> His motivation seems to be uncontrollable, flowing viscerally from the music itself: “That list of delicious soundboard recordings by a master technician... It’s just something I can’t quite get out of my mind... I’m a normal guy that just happens to have some weird notion stuck in my head. Like an earworm, you know?”<sup>61</sup>

At this point I joined the discussion and explained why the recordings were not online. I also made sure the fans knew that anyone could come into the library, for free, and listen to the recordings without any hassles. Nonetheless, there were more calls to hack and, in the words of one fan make “library-free HD [Harvey Danger] music” a reality.<sup>62</sup>

Hacking into the collection was tried but failed, at least according to this fan:

I never told you guys about the kind of crazy Fort Knox lock-down these are under.... I couldn’t get to Safari/Firefox/Explorer, or to an IM or e-mail program, or ...as I said, anything other than iTunes. ... I don’t know much about Apple computers, or how to play little back-end tricks on them, but even if I did, I’m pretty sure they’ve thought of everything. Lock. And. Key.”<sup>63</sup>

Finally, a lengthy rant from a particularly frustrated fan:

I’m going [to the library] today. I’m taking a few days off from work and I’m going to check out the sound and the high security setup. I’m not happy about it though. Music was never supposed to be locked up like some kind of caged animal. Harvey Danger is part of Seattle’s history and the music should be available, even if for a fee, to anyone that wants to hear it. People think UW should be congratulated for preserving these recordings and I would agree but for the fact that I can walk into UW or any other library and check out books and recordings at will. Never do I have to rock out tethered to a plexiglass window like some sort of prisoner. And I freaking live in Emerald City. Can you begin to comprehend how pissed I would be if I lived three time zones away? Enough of this RIAA BS. I’ve bought the albums, I paid the entrance fees, I turned on other listeners. Get your bloody locked down server off my music.<sup>64</sup>

Is this person misinformed, dramatic, and suffering from grandiose notions of entitlement? Perhaps, but I believe he and many of his comrades hit upon something significant when making comparisons between libraries/archives and prisons, and as sites of control. These fans have uncovered an often unspoken stratum of social discourse about archives and libraries.

#### 4. Archival Prisons, Librarian Dread, Commodity Fetish

Archival scholar Erik Ketelaar argues that archives ought to be understood not so much as sacrosanct cathedrals that provide access to knowledge, but rather as controlling institutions, like prisons, that restrict access and obscure transparency. He writes that “the panoptical archive

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60 *ibid.*

61 *ibid.*

62 <http://www.harveydanger.com/bb/showthread.php?tid=2288&page=5>

63 <http://www.harveydanger.com/bb/showthread.php?tid=2288&page=3>

64 <http://www.harveydanger.com/bb/showthread.php?tid=2288&page=4>

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disciplines and controls through knowledge-power,"<sup>65</sup> displaying it "behind the closed doors of the prison-like repository" of the archive."<sup>66</sup> Ketelaar may sound like a Harvey Danger fan, but he's not (at least to the best of my knowledge) and is instead analyzing the archive and its practices through a Foucauldian lens, a lens that brings behavioral and discourse-related power differentials into focus. Could it be that the severity of the fans' frustrations are in some sense underpinned and amplified by these power differentials? Could it be that these fans are expressing something more than their conscious frustration with Crocodile Café Collection's offline status? Are they also expressing a deep-rooted sense of dread and fear of archives and archivists, libraries and librarians?

In a 2001 article for *Library Quarterly*, authors Gary Radford and Marie Radford examine the nature of the discourse surrounding libraries and librarians in popular, contemporary culture. Like Ketelaar, Radford and Radford contextualize their arguments within Michel Foucault's work, particularly as expressed in *Discipline and Punish (Surveiller et punir)*. They write,

fear is the fundamental organizing principle, or code, through which representations of libraries and librarians are manifest in modern popular cultural forms such as novels, movies, and television shows. Fear is the means by which the presence of the library setting, and the librarian characters within them, are to be understood. It is the horizon against which such representations make sense. This horizon of understanding is more fundamental than the representations found in any particular example, because it is what makes such images possible.<sup>67</sup>

Radford and Radford flesh out this theoretical framework with references to specific representations of librarians in popular culture (e.g., films such as *Sophie's Choice* and *Party Girl*).<sup>68</sup> As they state, "all of the representations depicted in these examples are made possible by underlying discourses of fear and control."<sup>69</sup> In highlighting such depictions, the authors substantiate that a discourse of fear shapes a meta-understanding of the librarians and the profession at large.

Libraries and librarians are then understood within an overarching discourse of fear and control. Does this help explain why so many Harvey Danger fans have visceral reactions against the library-confined nature of the Collection? Is their anger prompted by an ingrained fear of libraries and librarians? Are their calls to hack a way of fighting against the prison-like oppression of the library and archive? Yes, discourse about librarians may be steeped in power differentials, but is there not something additional at play here, something compounding the fans' rage, something about the nature of music itself that adds further tension to their expressions about the collection?

In an attempt to unpack this tension, let us visit Theodor Adorno and his essay "On the Fetish-Character in Music and the Regression of Listening." In it Adorno argues that musical life in modern society has been completely and utterly overtaken by the commodity fetish. Where there was once musical creativity there is now only musical passive consumerism. In his typically impenetrable style, Adorno writes:

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65 Eric Ketelaar, "Archival Temples, Archival Prisons: Modes of Power and Protection," (*Archival Science*, 2002): 221.

66 *Ibid.*, 234.

67 Gary P. Radford and Marie L. Radford, "Libraries, Librarians, and the Discourse of Fear," (*Library Quarterly*, 2001): 299.

68 In support of Radford and Radford's arguments, see this montage of film clips from *Citizen Kane*, *Sophie's Choice*, and *Party Girl*: <http://www.criticalcommons.org/Members/vallier/clips/librarians>

69 Gary P. Radford and Marie L. Radford, "Libraries, Librarians, and the Discourse of Fear," (*Library Quarterly*, 2001): 301.

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In Capitalist times, the traditional anti-mythological ferments of music conspire against freedom, as whose allies they were once proscribed. The representatives of the opposition to the authoritarian schema become witnesses to the authority of commercial success. The delight in the moment and the gay facade becomes an excuse for absolving the listener from the thought of the whole, whose claim is comprised in proper listening. The listener is converted, along his line of least resistance, into the acquiescent purchaser.

Stated another way, music's inherent sublimity and power to oppose authoritarianism has been displaced in contemporary society by the supremacy of commercialism. Music, in short, has merely become a vessel for commercial content, a jingle to sell goods, and a commodity in itself. As musicologist David Huron notes in relation to Adorno's approach,

In modern capitalist society, the only legitimate pleasure to be got from music is to appreciate its exchange value. The consumer is really worshipping the money that he himself has paid for the ticket to the Toscanini concert. Pleasure is derived from the idea that the music is valuable rather than taking pleasure in the music itself.<sup>70</sup>

What does this mean for Crocodile Café Collection? Does the fans' rabid desire to own and possess the recordings signify a subliminal addiction to music as commodity, a fetishism of music's monetary worth and exchange value above and beyond the music's pre-capitalist efficacy? For Adorno this answer would be a yes. Consumerism has reduced artistic expression to a product for sale. It is merely a consumable, a commodity. It is not a work that is meant to endure. Recordings do not exist to make music available. Instead, music in mass society exists in order to sell recordings, concert tickets, and t-shirts. The end goal of having sound recordings, like those in the Crocodile Café Collection, is not to enter into the sublime or to expand ones horizons of understanding and creative output. Rather, the end goal is to download, possess, and consume them. Consumers regressively listen to and fetishize music as a commodity, and therefore only know one way of experiencing it: by owning it. Non-circulating archival collections made available in non-commercial library spaces frustrate them to no end. Add to this the discourse of prison-like fear that cocoons popular perceptions of libraries, librarians, archives, and archivists and we layer anxiety, angst, and dread to the fans' experience. It is no surprise then that these fans reacted to the unveiling of the Crocodile Café Collection with irritation.

## 5. Onward

If this cocktail of criticisms is even partially accurate, where does that leave the collection, the fans, researchers, donor, artists, and—yes—the archivists who are involved with the collection's care? Should we resign ourselves to remain at odds? No! I like to think of archivists and librarians as being open to conversation, masters of engagement and mutually beneficial compromise, even if heavy weight discourse is pushing against us. In that spirit I have worked with Anderson and Harvey Danger to stream all their recordings online.<sup>71</sup> And beyond fandom, I have worked with scholars to make more recordings available for online access. While intentions are good, many of these scholarly interactions tend to subtly parallel those exhibited by Harvey Danger fans, interactions and expressions that are inevitably steeped in a discourse of fear, control, and a web of commodity fetishism.

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70 <http://www.music-cog.ohio-state.edu/Music839B/Approaches/Adorno.html>

71 You can find the Harvey Danger recordings, along with samples from other recordings, on the UW Libraries SoundCloud site: <https://soundcloud.com/uwlibraries/sets/crocodile-cafe-collection>

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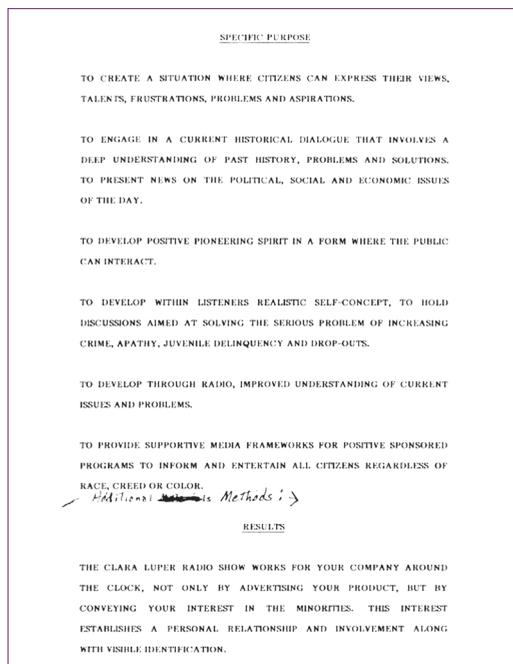
## THE CLARA LUPER COLLECTION AT THE OKLAHOMA HISTORICAL SOCIETY: COMMUNITY DESCRIPTION

JA Pryse, Oklahoma Historical Society, USA

If not us, then who?  
If not now, then when?  
– John Lewis, U.S. civil rights leader and political figure

In the fall of 2012 the Estate of Clara Luper graciously donated Luper's entire collection of scrapbooks, magnetic tapes, photographs, manuscripts, books, and paper records to the Oklahoma Historical Society (OHS) to serve as guardian of Luper's life-long work with civil rights in the United States. Educator and civil rights leader Clara Shepard Luper was born in Okfuskee County, Oklahoma in 1923. In 1944 Luper received a bachelor's degree from Langston University. She later attained a master's degree from the University of Oklahoma in 1951 and was the first African American admitted to the graduate history program in the University of Oklahoma. Luper taught history and public relations at Dunjee High School in Spencer, Oklahoma, and at John Marshall and Classen High Schools in Oklahoma City. While teaching, Luper wrote, directed, and produced *Brother President*, a play based on the life of Martin Luther King, Jr.<sup>72</sup>

Luper's legacy in the field of civil rights is recognized not only in Oklahoma but also throughout the African American community in the United States. The Clara Luper Radio show was broadcasted for over three-quarters of Luper's life and roughly totals over 550 recordings, including 1/4" open reel tape; cassette tapes; and CDs from 1960–2006. The gradual decay of the carriers over time has caused great concern for the loss of these original recordings.



Caption: Draft description of the goals of the Clara Luper radio show. Imaged from OHS archives.

72 Decker, S. L. (2005) LUPER, CLARA SHEPARD (1923 – 2011 ). Retrieved May 15, 2014, from <http://digital.library.okstate.edu/encyclopedia/entries/l/l0005.html>

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Because of the unquestionable significance of the Clara Luper Collection, the OHS Audio Department not only recognizes the importance of proper handling but also recognizes the immediate need to take measures to ensure that our State's oral history is safe and available for future usage. The goal of the OHS Audio Department is to inventory the collection and create an organized database of information documenting the recordings, as well as to identify the state of the recordings in terms of current and future accessibility and current and future requisites of care.

The steps in our process are as follows:

1. Identify the media—composition of tape, reel, or disc
  - Visual inspection
  - Technological inspection—to identify the tape, origin, material, and composition of the media
2. Clean the media—making repairs and preparing for preservation
3. Assess the stage of deterioration and make a detailed plan for transfer to a digital file
  - Best available long-term preservation method
4. Prepare for digital conversion
  - The digitization specialist will verify the tape has been properly prepared for transfer, and that signal path, tones, levels have been appropriately calibrated
5. Create master and access copies—plan for storage capabilities and future accessibility
6. Create metadata—through the Clara Luper Pilot Program
7. Perform quarterly assessments of the master and access copies of all media as well as the original reel or cassette will be aligned with the original calendar of preservation as determined by the Digitization Specialist. If damage or external circumstances call for a re-evaluation of the material, the Digitization Specialist will begin conservation efforts immediately.<sup>73</sup>

This paper documents the efforts made during step #6 above. In May 2013, the Clara Luper Pilot Program was established to reach out to the community of Oklahoma through the development of a crowd-sourced description program that allowed for community supported data collection of the Clara Luper Radio Show. As the profession advances and technology evolves the need to preserve and share the Oklahoma Historical Society's holdings has become a greater need. Thus, through community and organizational efforts we have begun an inexpensive and effective manner to provide detailed and accurate data for user retrievability. As with most small organizations, the funds and staff necessary to be successful with a large scale project is nearly non-existent. It is with the support of our local community and innovative ideas that we can perpetuate the legacies of our Oklahoma legends.

The absolute need to prevent the loss of historical data is not only imminent and falls within the mission of the OHS to "preserve and share Oklahoma history" but is also a must in order to share the history of Oklahoma with patrons, educational organizations, and staff and future generations. The first step in the process is the evaluation and assessment of the current state of the entire Clara Luper Collection. Through collaborative efforts the audio laboratory functions as a digital outlet as well as a quality preservation environment that adheres to strict standards of operation following technological guidelines that enhance the digital quality of the original recording.

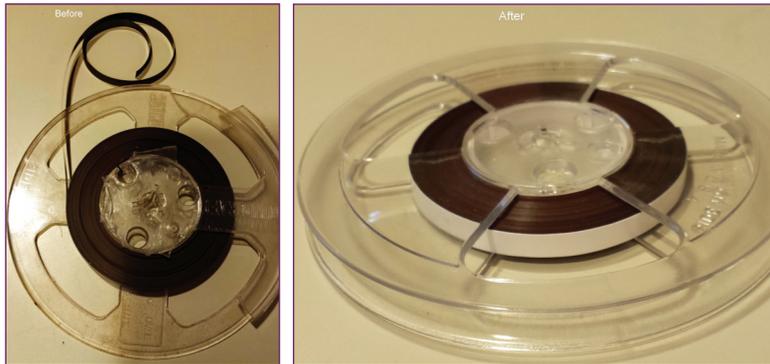
Samuel Brylawski, preservation pioneer, explains, "The future of audio preservation is reformatting audio tapes and discs to computer files and systematically managing those files in a repository." Further Brylawski writes, "The well-planned repository presumes media obsolescence, plans for it, and, according to its supporters, frees the archive community of the futile search for an affordable permanent medium." One major issue stated by Brylawski is that

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73 Guidelines on the Production and Preservation of Digital Audio Objects (web edition). (2009). International Association of Sound and Audiovisual Archives. Retrieved May 15, 2014, from <http://www.iasa-web.org/tc04/audio-preservation>.

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“whether for lack of foresight or funding, libraries are not creating mass-storage systems for audiovisual works... We face an extraordinary dilemma: at a time when a greater range of audio is available to more people than ever before, and the means are finally at hand to preserve those sounds for prosperity, we stand the greatest risk of losing them.”<sup>74</sup>



Caption: Before and After images of a tape from the Clara Luper Collection.

Establishing a well-planned repository not only safeguards the Luper collection but also ensures future accessibility of the digital files through effective metadata creation. The Clara Luper Pilot Program acts as the instrument which provides the metadata through community member's actual experiences. Personal knowledge of key figures, dates and events provide a more thorough understanding of Luper's Radio Shows. As Luper was extraordinarily involved within the community, it is evident that the subjective experiences of her community should be involved in preserving and perpetuating her legacy.

In July 2013, digital copies of Clara Luper Radio Shows were distributed to the Oklahoma City African American Community (OCAAC) by way of the Clara Luper Legacy Committee and the Black Heritage Committee. Packets delivered included 8–10 digital radio shows each; a worksheet; and guidelines to listen and write their interpretation, views, names, and sources. The community involvement has led to greater community support of the Oklahoma Historical Society increasing interests in assisting with the next phases of the program.

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74 Brylawski, S. (n.d.). Preservation of Digitally Recorded Sound. – Council on Library and Information Resources. Retrieved May 15, 2014, from <http://www.clir.org/pubs/reports/pub106/sound.html>

## **INSTRUCTIONS and INFORMATION:**

Please write any descriptive data that you might hear on each individual track such as DATE, KEYWORDS, and SUBJECTS, IMPORTANT FACTS mentioned or anything at all that we can use to describe the specific track. Please use as many pages as needed. There are no limits to our cataloging. The main focus is getting as much info so that we can link the public to digitized files.

### **EXAMPLES:**

Track# 2012.188.0301

Date: (Mrs. Luper mentioned that "today Jimmy Carter was inaugurated") January 20, 1977

Keywords: president, United States, democrat, oath of office etc.... (the track also went into other subjects such as advertisements 'Rainbow Bread', Tire's Etc...., First Baptist Church.)

Mrs. Luper WILL go into several different subjects or topics on each track (radio program) PLEASE mentioned ALL KEYWORDS for ALL SUBJECTS and TOPICS!

Locations: Sometimes Mrs. Luper is reporting from another State or from another town in Oklahoma, if the location is mentioned or you just know where she is then PLEASE list this location.

**\*\*note\*\*** some of the tracks are of Mrs. Luper's history classes. If you happen to know any of the kids in the audio or any significant information about the tape or the class please let us know by writing this on the form.

Our goal with this pilot project is to get this important information to the public, to the community and to the world. Mrs. Luper's legacy must carry forth and with your help we can make this happen!

Thank you for your time and your help with this extremely important task.

*Caption: Example of text as delivered to community volunteers.*

When planning a project where the professional experiences surrounding archives and archive management are limited it is best to avoid technical information and more important to effectively explain what is necessary. Therefore, creating the packets that were delivered to the community took a well-thought-out structure in relatively lay terms and with options for computer-based applications or paper and compact disc (CD) packets. The OCAAC surveyed the community. The results of the survey highlighted the need to have mixed formats readily available. Within each packet were a set of instructions and a worksheet to fill out as each show was listened to:

As each packet was returned, metadata was created, embedded, cataloged, and uploaded to the Oklahoma Historical Society Oral History and Audio Collection Channel available on YouTube: <https://www.youtube.com/user/OHSaudioDept>. Future goals include housing the files on The Gateway to Oklahoma History website <http://gateway.okhistory.org/> as the primary mode of effective distribution. The Gateway to Oklahoma History was developed to host the OHS National Digital Newspaper Project and provides a searchable web-based resource that allows

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access to selected newspapers from Oklahoma free of charge.<sup>75</sup> The Gateway also provides a multi-line outlet that presents other materials including digital representations of text, film, photographic images, audio, and visual materials.

The long-term goal of The Oklahoma Historical Society is to digitize, preserve, and make available to the public the entire Clara Luper audio collection, which totals over 550 recordings, including 1/4" open reel tapes; audio cassettes; and CDs. The OHS believes that this undertaking will successfully contribute to the perpetuation of these significant sound recordings that represent a number of national subjects, events, and individuals of historical note. Continued community support is necessary to reach this goal. With only one full-time Digitization Specialist on staff, the magnitude of the collection could be lost in time, not due to lack of concern but lack of staff support. With the Clara Luper Legacy Committee and the Black Heritage Committee's continued support, and with the support of Bruce Fisher, retired Administrative Programs Officer and Administrator of Special Projects; Chad Williams, Director of Collections; and James Holley, volunteer, the Clara Luper Pilot Project will succeed and prove to be an effective model for those institutions challenged with financial and staffing limitations.



Caption: Clara Luper at the microphone, working on her radio show.

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75 The Gateway to Oklahoma History. (2014, January 1). The Gateway to Oklahoma History. Retrieved May 15, 2014, from <http://gateway.okhistory.org/>.

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