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42ND ANNUAL CONFERENCE OF THE INTERNATIONAL ASSOCIATION OF SOUND AND AUDIOVISUAL ARCHIVES (IASA)

Frankfurt, Germany, 3-8 September 2011

Digital Sense and Nonsense: Digital Decision Making in Sound and Audiovisual Collections

Digital has been with us for many years now, so much so that there is little disagreement in the sound and audiovisual world that digitising our heritage collection is the best way to preserve and sustain access to our valuable content. Virtually all new materials are now collected in digital form so there is little choice but to manage our digital collections if we want to keep them for future users. There are many examples of digital strategies working well, and many new initiatives which expand the number of users we reach and the way we use our collections. So why is there still so much discussion, so much concern? Why are there still so many complex decisions to make? Is it just that there are big hopes but bumpy roads, big promises but limited resources, incredible semantic possibilities but illegible road signs.

Is it due to the varied needs of the disparate field of creators, performers, recordists, intellectual property owners, depositors, collectors, archivists, technicians and users? Is this because of the great diversity in the capabilities, competence and capital of their owners, curators and managers? There is a great range of issues and concerns that we all have in common: digitization now has become a necessity, standards are being agreed upon and mutual solutions are shared — but myths are also created and perpetuated... This conference will be a forum to review the field, investigate and discuss the following subthemes and expose the misinformation in the digital age:

- Facts, advice and misinformation on the digital way
- The challenge of format varieties
- Added value and funding the feast
- Metadata
- Turning archives into assets
- Mass digitization
  - Workflows and bottlenecks
  - Appropriate technology and suitable scale (or when small is beautiful)
  - Does one size fit all?
  - The big, the bad and the ugly
- Open access and open standards
- Access and aggregators
- Managing change in the digital age
- Management myths and technical realities
- Storage solutions (and what about the original analogue material?)
- Collecting sound and audiovisual materials in the digital environment
- Social media and digital sound and audiovisual collections
- Digital preservation and the digital divide: who can afford to digitize?
- Training, education and learning within a digital domain

The 42nd IASA Annual Conference will be hosted by the Hessian Broadcasting Corporation (Hessischer Rundfunk, hr), German National Broadcasting Archives (Deutsches Rundfunkarchiv, DRA) and the German National Library (Deutsche Nationalbibliothek, DNB) in Frankfurt am Main, Germany, 3-8 September 2011.

Please find all conference information on the conference website at www.iasa-conference.com
For any further information or questions please contact the Organising Committee and the conference administrator through enquiries@iasa-conference.com

If you do not have internet access and you would like to register for the conference, please contact the Conference Coordinator Jacqueline von Arb — by phone: +47 98 25 06 28 (GMT+1, or London time + 1 hr) or the Secretary General Ilse Assmann by fax: +27 (0) 11 714 4419

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

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I know you have all been sitting on the edges of your seats wondering where your IASA journal issue number 36 is. I apologise for its late arrival on your desks. As you know most of the articles published in the journal are drawn from our annual conferences, which are normally held in September of each year. This gives a reasonable turnaround time to get papers in, review and edit them, and get them to the designers for layout and printing so that journals hit your in-trays in December or January. Our annual conference this year was held in November rather than September, so we (authors, designers, printers, post room staff) have been chasing our tails to prepare the issue in good time. I'd like to thank authors for their speedy reactions to my requests for papers.

The experience of this rather rushed production timeline has demonstrated how good it would be for the editor to have a few papers in store for publication. I would invite all IASA members to consider offering papers at any time to the editor for consideration. These don't have to be papers presented at IASA conferences: perhaps you've delivered at another relevant conference, or you've been working on something that you think would be of interest to IASA members. Deadlines for each issue are 31 March for the summer issue and 15 October for the winter issue. Offers of papers are always welcome.

In this issue we benefit from the experiences of colleagues at Cube-Tec (one of IASA's sustaining members), the Austrian Mediathek, the Centre de Recherche en Ethnomusicologie (Research Centre for Ethnomusicology, CREM-LESC-CNRS) and from The British Library. These presentations demonstrate our two fundamental concerns: the process of digitisation/preservation, and the mechanisms for unlocking our collections/access (dissemination). They talk of lessons learned for improving audio and video digitisation accuracy, efficiency and workflows, on the one hand, and, on the other, of means of harnessing the potential for added value from our users via web technologies.

The IASA/AMIA conference in Philadelphia in November was all about convergence. The included paper from our colleagues at the HathiTrust (University of Michigan, USA) provides an interesting take on a repository's attempt to integrate audio into an archive system already established for text and image files. The paper therefore points to some of the similarities and differences of the various media. I read the paper, additionally, as providing good instruction for those smaller archives around the world which are embarking on digitisation programmes of their own. The authors include resources they found useful in their decision making.

Finally, I had the privilege of being at Tony Seeger's keynote address at the Philadelphia conference. Tony's inclusive approach to audiovisual archiving is underpinned by his own anthropological research in Brazil that allows us to ponder the challenges we audiovisual archivists face as we attempt to "converge": the diversity of human societies and languages, the increasing desire of these societies to document their own lives and experiences, the fact that audiovisual documentation can never archive the full experience (what of aromas, sensations and emotions?), the diversity of methods and approaches to archiving (lack of interoperability and shared standards), the fact that although progress in addressing many of the challenges is being made, "many of these things are constantly changing; by the time we have figured out how to manage them, they will have changed again".

Members will know that Tony received the 2010 IASA Award of Recognition for his long-term "advocacy for the cause of audiovisual archives, communities and music". What we should have included in his commendation was special mention of his unfailing ability to balance thorough analysis of the issues with pure entertainment. His presentation was interspersed with self-penned verses sung with gusto by himself and the entire assembly to the tunes of "Sweet Violets" and "This Land is Your Land". He has written up his presentation for publication here including these verses. Something to hum along to as we read.

Yours truly,
Janet Topp Fargion
Editor IASA

The old year has passed, and as we start the New Year it is always worth while to review what we have done, and amongst the many things that the IASA membership has achieved for our organisation in 2010 is the IASA AMIA joint conference. We themed our meeting Together for a Sound Vision, but we were pleased to find, from the very first workshop and meeting in Philadelphia, that vision expanded by the synergies that come from a joint meeting. The length of expertise that this meeting of our two organisations brought together, the depth of knowledge and the breadth of our combined interests made it an event in which many shared in some extraordinary meetings of vision. The keynote, delivered by Professor Anthony Seeger, also recipient of the 2010 IASA award, masterfully brought together the discussion of convergence with the complexity of its implementation, and any keynote whose key messages could be summarised and delivered as song is one which will be long remembered (you just had to be there)!

The range of successful papers and impressive workshops seen in Philadelphia continue to cross fertilize ideas within our two organisations. We joined in meetings that addressed issues of common concern and looked at shared practices and shared issues. And in doing this we met old friends and made new ones. Congratulations and a big thank you to all who made this conference a success; one that will continue to bear fruit for years to come.

The world economic environment has been going through something of a shake-up over the past year or two, yet the impact of the global financial crisis has been slow in coming to our part of the world community: The business of sound and audiovisual collecting and archiving has not, until quite recently, really felt its icy grip. Now however, as the banks look for support from governments, and in turn governments and industry alike look for ways to reduce spending, there are announcements and reports that many of the major collecting and archiving institutions are being forced to cut back on the work they do and the services they provide. As part of the responsible sound and audiovisual archiving community we need to ask: Who makes the decisions about how to reduce funding in an archive? How are the effects of budget cuts weighed against the benefit of our AV collections?

Loss of funding is one of the biggest risks to a collection of sound and audiovisual items, and especially to digital collections. The failure to fund vital infrastructure at critical periods can lead to irretrievable loss. We are, by the nature of the material we preserve, dependant on the technology to get access to our machine readable collections. So when the time comes to weigh up the consequences of budget cuts, to decide between a reduction in services or a reduction in standards, between collecting less and managing with less staff, those decisions should be informed by best collection management based principles rather than just the bottom line of monetary savings.

The day to day business of IASA members has long involved the risk mitigation and management strategies that ensure our collections are maintained and available. We have developed policies to do with all sorts of other risks; fire, flood, carrier degradation and equipment obsolescence. Similarly, the ability to manage with periodic reduction in income should be one of the key identifiable risk mitigation factors in our management plans. This is a challenge for IASA; to provide relevant and useful advice and advocacy in circumstances where any and all possible outcomes may not be desirable, but where navigating the potential scenarios to find the best result needs to come from well informed, expert knowledge, supported by a knowledgeable international community of wide and varied experience, not just those with control of the purse strings. If we believe that these economic events are to some extent cyclical, and the evidence of history supports that, we need to make the decisions that ensure that the collections we manage are available for the future to use.

IASA's role in bringing the expertise of large projects in well funded communities and countries to bear on the problems faced by developing countries is well established and much respected. The successful partnerships between some of our members are testament to that program. However, the knowledge we have gained working in those partnerships in paring down our

approach to produce lean programs that still comply with standards should now be turned to our thinking about keeping the previously well funded institutions afloat.

As is most often the case, our IASA members have the wherewithal to bring great expertise to the table and to help all our members manage the challenges we currently face.

One forum in which this debate can grow is at the Frankfurt IASA conference in September 2011. Titled "Digital Sense and Nonsense: Digital Decision Making in Sound and Audiovisual Collections", the conference will address many of the issues that are made overt by the circumstances we are now faced with. We are a long way down the road of digital preservation. We are past the period of proselytising our belief in the digital solution, or at least we should be: instead we are operating in a mature, standards based, technological environment. So why do so many presentations and papers treat the process like it's a new thing. We hope to talk about this and the many issues that continue to surface in our archival environment.

I look forward to seeing you all in Frankfurt.

Yours truly,
Kevin Bradley
President IASA

BEFORE CONVERGENCE WAS DIVERGENCE: PUTTING HUMPTY DUMPTY BACK TOGETHER AGAIN[1]

Anthony Seeger, UCLA

It is a great honor to have been invited to speak to the assembled members of IASA and AMIA. It is also a great pleasure to be talking with you here in the city of Philadelphia. This city is famous for a number of things, among them that it was for many years the home of Benjamin Franklin, a diplomat, publisher, inventor of a stove, bifocals, and of the recipe for a particular kind of spruce and molasses beer that you can still find in some local taverns. A lesser-known accomplishment of his was that he wrote ballads for his brother's newspaper in Boston. Not a single copy of his ballads survives. There were fewer archivists then, and we should all be somewhat concerned about the ability of our holdings to be accessible in 250 years. This is also the city in which the United States Constitution was written and signed, with its article on patents and copyrights, which I shall discuss later.

This paper has several parts, each one indicated with a subtitle and introduced with a verse of a song. It takes its title from a nursery rhyme about an egg named Humpty Dumpty who falls off a wall (see Figure 1): "Humpty Dumpty sat on a wall/Humpty Dumpty had a great fall/ All the king's horses and all the king's men/ couldn't put Humpty Dumpty together again." My reference to the nursery rhyme means to suggest that part of the problem we will have with convergence is that we are dealing with only fragments of a formerly unified thing – the egg, or the recorded event. Before the king's men futilely tried to put him together again, the egg/man had smashed into many pieces and could not be reconstituted. This is also partly our problem as multimedia archivists.

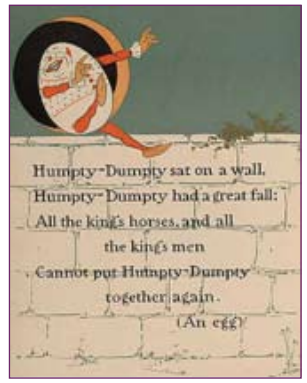

Figure 1. Humpty Dumpty, shown as a riddle with answer, in a 1902 Mother Goose story book by William Wallace Denslow (public domain, from Wikipedia, accessed 9 December 2010).

My presentation begins by describing two divergences that make our attempts at convergence more difficult. It goes on to discuss other challenges to convergence, including the number of people making audiovisual documents today, difficulties of language, intellectual property issues, hardware and software obsolescence, the unique characteristics of each form of media and others. Many of you in the auditorium or reading these words are working on the cutting edge of various kinds of convergence — in cataloging and metadata, digitization, legal issues, multimedia projects, and others. I cannot hope to address the technical details in each of your areas of specialization in any coherent fashion. Instead, my intention in this talk is to add some perspective on the issues you may not have thought much about.

1 I would like to acknowledge assistance from Aaron Bittel, Stephen Davidson, Any Kolovos, Janice Simpson, for their assistance in planning and delivering this paper.

I begin with a song.[2]
"Lost, Lost Forever (The Archivists' Lament)"

Words by Anthony Seeger 2010

There once was a collector who recorded some tapes
When she was done she needed some space
And so she did box them and carefully went
And stored them way down in her wet basement.

Chorus:
Lost, lost forever, no images and no sound
No one can use them, the collector abused them
Now we have lost them for good

A musician's young children knew that their mom
Recorded some songs at one time for someone
So they Googled the scholar and spoke to her son
Who said that he took them all to the dump.

Chorus: They were
Lost, lost forever, no images and no sound
No one can use them, the heir has abused them
Now we have lost them for good.

Before I start enumerating the challenges of convergence in the sense many of you probably think of it, I will highlight two divergences. These two divergences make our task of convergence immensely more complicated.

Divergence 1: The movement of Homo sapiens around the globe

Homo sapiens appeared a long time ago
And traveling the world we quickly did go
We talked and we sang and we danced as we went
But nothing remains, there were no archivists then

Chorus: Lost, lost forever, no images and no sound
No one can use them, archives didn't exist then
And so we have lost them for good.

Homo sapiens emerged in Africa and then spread (diverged from a single point) to most of the earth's dry land. As the groups separated, their languages also diverged. Ideas, expressions and experiences diverged. As a result of this first divergence, we have not only different languages, written scripts, and performing arts, but also different concepts of person, place, time and more. In the United States there is a tendency to presume the dominance of English language

2 The Song: the purpose of the song that I wrote for this presentation, whose verses I have inserted at a number of points in my presentation, was to indicate the transition from one section to another, and also to repeatedly involve the audience in the progress of the paper by asking them to sing the chorus. The verses blame the loss of data on collectors, heirs, hardware and software obsolescence, and archivists — all of which will be familiar to readers of this journal. The song also calls attention to the types of data still unavailable for archiving and therefore unavailable for inclusion in any plans for conversions of current data. The points made in the verses are thus central to the paper itself. One melody to which you can sing this is that of "Sweet Violets" — a 1951 popular song. Dinah Shore's hit version http://www.youtube.com/watch?v=LtnLvrmyh3E begins with the chorus. After that you may sing the lyrics to that melody if you like, or make up another one. For those readers who were not in Philadelphia, I can only say that the assembled IASA and AMIA members sang beautifully and with enthusiasm.

and to focus on our own productions. Similarly, our automated data mining projects tend to focus on English language sources. But this is very shortsighted. The linguistic and conceptual divergences in human populations are immense.

We have little record of the divergence of our species because few traces have survived from that era. We do, however, have records of many of the contemporary dispersed communities — offshoots of that prehistoric divergence. One of these is the Suyá/Kïsêdjê tribe in Mato Grosso, Brazil, where my wife and I have spent years doing research and collaborative work.[3] When we first visited them in 1971, the 80 or so surviving members of the group lived in a single remote village of about seven houses on the banks of a small river that was very difficult to reach from other parts of Brazil. They had fairly recently made peace with Brazilians. The only recording device in the village was my battery-operated Uher reel-to-reel tape recorder. They were proud of their musical traditions and were happy to know that should their children not care to learn the music and stories I recorded, their grandchildren would be eventually able to consult them in an archive in the United States — although they had never seen an archive and only knew the United States was in the opposite direction from that of the Southern Cross in the sky.

Figure 2. the Suyá/Kïsêdjê village in 1972. Photo by the author.

In 2010 the Suyá/Kïsêdjê live in a large circular village of over 25 houses, with three other satellite villages not too far away, on the banks of a smaller river where their grandfathers lived before they made peace with Brazilians. Their village today has its own dirt airstrip and a nearby administrative building, bilingual school, infirmary, and culture center all administered by them. Their village can be reached fairly easily by a dirt road. Their population today is four times larger than it was in 1971, and everyone is healthier. An aerial photo of the current village reveals small white dots behind many of the houses in the village circle. These are parabolic antennas. The Suyá/Kïsêdjê are enthusiastic adopters of many kinds of technology,[4] and many

3 For an English-language online encyclopedia entry on the Suyá/Kïsêdjê, view http://pib.socioambiental.org/en/povo/kisedje

4 For a discussion of research technology and local communities, see Seeger 2004-2005

houses now have DVD players.[5] They have a cultural resource center with three computers equipped with software for analyzing music and for transcribing their myth using their own orthography. They now have digital copies of all of my recordings from the 1970s, which they transcribe and use in their productions and also as resources interview the surviving elders about traditions they do not know. They have a small video production company, with video cameras of a quality that my research budget does not permit me to purchase. And they have excellent microphones and are better filmmakers than I.[6] Like many communities around the world, they are enthusiastically documenting their own cultural traditions with all this equipment so that future generations can learn from today's elders.

This brings me to the first *convergence*. Almost all communities around the world today are busily using audiovisual equipment to document traditions they consider valuable with the intention serving future generations. They have been able to obtain funding or gifts of high quality audio and video equipment, and have learned how to use it with impressive skills. Documentation efforts have further increased after the adoption of UNESCO's 2003 Convention for the Safeguarding of the Intangible Cultural Heritage (UNESCO 2003), with its emphasis on creating national inventories of cultural items. But there has not been a similar emphasis on archiving and preservation. These well-intentioned world-wide efforts to transmit cultural traditions through media are based on a mistaken premise — that media will survive longer than human memory. In fact, as we know, most digital media today will not last very long, the equipment will become obsolete and the materials difficult or impossible to play back. If it is to survive, it needs to be archived. Yet a similar amount of money has not been invested in establishing audiovisual repositories where the new materials can be preserved, migrated to new formats, and ultimately made available to the future generations as wished by the recordist. On the contrary, most of our archives have seen their budgets cut, their staff diminished, and their contributions to world culture denigrated. Although there are some efforts to preserve Internet sites, it is difficult to predict how the Internet will fare as a preservation site in the long term. Whereas 40 years ago, the only recordings of the Suyá/Kïsêdjê came from my small tape recorder during the few months I was with them, today they record large amounts of videotape and audio recordings whose future is problematic.

The fragmentation of the event into several media, or when Humpty Dumpty falls from the wall

Remember the time when you danced all night long
And the smell of the air as you walked home?
Recall the crush of the crowd and the taste of the beer?
Your phone has a video — but none that's there

Chorus: They are
Lost, lost forever, no aromas, no tastes, no crowd
We lose all those feelings when with media we're dealing
Now we have lost them for good!

If the first diversion was the movement of Homo sapiens from a single part of Africa to the rest of the globe, another divergence was the fragmentation of events into a number of different media. Let's imagine that you, the participants in the IASA AMIA conference, go out tonight for the Philadelphia pub-crawl and visit a number of the bars in the city. This event will be a combination of multisensory experiences. Some of these can be caught on still images — members of the conference holding up their mugs and smiling for the camera. Someone's cell phone could capture the view of IASA's President singing an Australian folksong after several mugs. And some aspects of your evening could be caught on audio recorders — the sound of the music, the noise of the crowd, the footsteps splashing on the wet sidewalk occasionally drowned out by the hissing of car tires on the rainy streets. With a bit more effort a museum curator could acquire the glass you drank from, the bar and its stools, and some of the liquor bottles and put them in a museum. One could argue that digitized photographs of these objects could be attached to the files of the audio and video recordings and to those of the still recordings and thus brought together in a kind of convergence. In fact, that is one of the objects of the discussions at our meeting.

But the convergence of these digital files of sounds, photos, and moving image would be only a partial convergence. They do not include everything. What is lost? First of all, aromas: the aromas of aftershave and perfume as you pushed up to the bar; the smell of the spruce beer, the stink of vomit in the bathroom; the fresh air outside on the street are all lost. We have not yet found a way to archive aromas, although they are very powerful aspects of experience. Second, physical sensations are not captured. The feeling of being pushed and jostled from all sides in the midst of the crowd by the bar is lost. The smooth feel of a cold glass in the hand, the pain of someone stepping on your toe, and the sensation of intoxication are unrecorded. We try to capture these sensations with words and in moving images, and of course in dances and songs. But those parts of your night out have been lost. And there is more: the taste of Philadelphia cheesesteaks, the spruce flavor taste of Benjamin Franklin's recipe for beer, and salty taste of the Alka-Seltzer taken later are also undocumented. While we have recipes for food and drink which can easily be digitized and stored, we do not have a way of recording the body's sensations of them. And there is yet more: the emotions and significance of the evening are part of your experience of this conference, and are not recorded. Your emotions are partly the result of the all of the other aspects of the event I have mentioned, plus the meanings you ascribe to them and the emotions sparked by them. In sum, while we are able to record parts of human experiences, like going to a bar, we really miss a lot of it still, no matter how sophisticated our equipment. One of the reasons ethnomusicologists and anthropologists participate in events as well as document them and interview people about them is because we seek to encounter some of the non-recordable experiential aspects of musical performance and social life, which in turn may give us insight into their significance.

Figure 3. The author singing and experiencing the Suyá/Kïsêdjê Jawari, September 2010. Photo by Elizabeth Seeger.

5 They are trying to maintain a degree of control over the new technology, however. They have refused an offer of powerlines to their village, preferring instead to be able to turn off the village generator and have everything silent. During the H1N1 flu epidemic in 2009 they closed their village to outsiders and took advantage of everyone being together to sing and dance for weeks on end without the interruption of NGOs, school schedules, or other outside involvement and obligations.

6 A short (5 min.) example of their filmmaking can be seen in the representation of one of their myths with subtitles in English, Spanish, and Portuguese: http://www.youtube.com/watch?v=wmtwNxYCUvo They have used two of my 1970s recordings as background music.

150 years ago there were only a few audio recordings on soot-covered paper and no moving image recordings at all. If Thomas Edison had invented the video recorder in 1877, instead of first an audio recorder and then later moving images, our archives and our fields would be very different today. In my field, music and dance would not have been separated. The cataloguing of sound and image would probably have developed in a single way rather than separately. Instead, the collection, preservation, and study of sounds went one way, and that of moving images another way, and physical objects yet a third. At this meeting we are working at how we might draw some of these three together.

Over the past century and a half some commercial media have brought aspects of experience together in order to create something like an original experience. Certainly the effort is one of the features behind the creative technique of filmmaking — Alfred Hitchcock could famously make viewers feel the emotions of protagonists. LP records, although almost forgotten today, were a great multimedia advance. Images, text, and sound were all present and easily readable through random access and without software. The CD-ROM later brought greater amounts of material together. And does anyone remember the Aroma Disc of the 1980s? This was not a recording medium, but rather a "CD-SOS" (my term: a small disc with Smell Only Scent) floppy-disk-drive-sized box that heated 7-inch computer disc look-alikes that gave off aromas that presumably would contribute to the experience of events such as a date. The host could choose among leather and spice, an Italian dinner, pine needles, and other scents that might enhance the occasion. I acquired one of these devices for the Indiana University Archives of Traditional Music and threatened to rename the institution the Indiana University Archives of Total Experience, but found it to be an unsuitable playback mechanism.

150 years from now people will laugh at the primitiveness of what we are able to record of events. They may well have devices for recording touch, aroma, and physical sensations as well as emotions. They may look back on the aroma disk as a pioneering endeavor on the level of the 1860 recordings of sound. Entertainment 150 years from now may be more like a full-experience computer game, or like the "holodeck" on the Star Trek science fiction series on television. In fact, as we think about how our converging information might be used, we would do well to consider the rapid development of computer games and how our materials might be used to create that kind of environment.

In sum, when we record a rich multi-sensory event like a trip to a bar in Philadelphia with existing equipment, it is a little bit like the figure Humpty Dumpty of the children's rhyme falling off the wall. We have bits and pieces of that event, but try as we might to put them together we cannot yet restore the whole event to its original completeness. As the rhyme says "all the king's horses and all the king's men could not put Humpty Dumpty together again." And one might add neither could all the world's audiovisual archivists. Any system for bringing together the data that we are currently able to record about human activities should leave room for future kinds of data to be added to it.

Having described two of the divergences that preceded our efforts for convergence (the migrations of Homo sapiens and their variation, and the incomplete data we can record about experience events) I will now turn my attention to convergence itself, and I will propose that it is a road paved with hell.[7]

Software obsolescence

Indiana folklorists worked for three years
To catalog their folklore on custom software
When they were done, how they celebrated!
But later the data could not be migrated

7 This is a play on the words of an English-language adage "The road to Hell is paved with good intentions." Convergence is a good intention — but it can include very unhappy experiences.

Chorus: It was lost, lost forever, they have no catalog at all
No one can find it, the computers can't read it
Now they have lost it for good.

In the early 1980s several Indiana University folklore graduate students worked for three years to create a database of the contents of the Indiana University folklore archive using customized software on a University mainframe. The cataloging was quite detailed, took a long time, and was a tremendous achievement. Not much more than a year after they finished, however, the university changed its mainframe computers. The computer staff migrated some of the software from the old mainframe to the new one, but did not migrate the cataloging program that had been developed for the folklore archive. An immense amount of labor and time were lost, and access to the collection still relies on the original paper records. One of the tremendous challenges to our efforts at convergence is the possibility of wasting vast amounts of time and money on projects that lead to dead ends. We have heard many similar cautionary tales at previous IASA conferences.

Hardware obsolescence

There once was an archivist who stored all on DAT
But when he tried, they would not play back
He learned that this format was now obsolete
And when patrons came by, he could only bleat

Chorus: Lost, lost forever, no images and no sound
No one can use them, the archivist abused them
Now we have lost them for good.

Hardware obsolescence has also plagued audiovisual archives. What is good for the market — selling new equipment and making media more portable — is not good for archives. There have been an alarming number of false starts in our preservation efforts. Copying materials onto DAT (never recommended by the IASA TC) was one of them; analog to digital conversion at CD quality was another; converting photos to low-level scans another, and converting film to DVD with some loss of quality is probably another. In audio archiving we agonized for a long time, and watched as digital technology and storage improved in quality and affordability, before deciding that 24/96 BWAV files were an acceptable, lossless, long-term storage solution. For video and film many of us are still waiting for an affordable, widely agreed-upon, format for our moving images. I am sure this will be a subject of discussion in some of the AMIA sessions in the coming days. I do hope you will eventually agree on one, because at the moment most audiovisual archives are storing their videotapes in the best conditions possible and waiting on the sidelines. It is still better to wait than to have to do the transfers twice — which is extremely costly and sometimes not even possible. Archivists have a huge responsibility to their material to ensure its long-term survival.

Intellectual property and ethical restrictions: to the melody of "This Land is Your Land"[8]

This song is my song, that song is your song
You just sing your song, and I'll sing both songs
My song's a copyrighted song, your song's a folksong
This song was made for only me

8 I have switched to a parody of Woody Guthrie's "This Land is Your Land" because of the contentious issue of music ownership today.

One of the great challenges to all kinds of convergence and public access is intellectual property and the ethical use of materials. I am not going address details of national or international copyright laws. Instead, I want to raise some more general issues that tend to get lost in the debates over the extensions of copyright terms and the demands of the Internet.

Most societies around the world have developed specific ways of controlling access to knowledge and also for transmitting it. The international copyright law we know is just one such system of ideas among many others. It is also important to note that ideas about rights over sound and image are often linked to concepts about person, to ideas about the origin and significance of sound and images, and to relationships of power. International copyright laws, and certainly those in the United States and Europe, are closely associated with 19th European and North American ideas about the individual, about creative genius, as well as a conviction about the value of the Capitalist market economy and colonialism. These ideas saw their greatest development during the romantic era of the 19th century and were not universally shared even among Europeans and Americans.

In keeping with our Philadelphia theme, here are quotes from two men whose ideas were involved in the establishment of the copyright provision in the U.S. constitution here in Philadelphia. Partly as a reaction to the English Crown monopolies on many types of manufacture, some American thinkers had strong reservations about the appropriateness of monopolies such as those in patents and copyrights.

James Madison, one of the signers of the Constitution, wrote in a 1788 letter to Thomas Jefferson in Paris: "Monopolies are sacrifices of the many to the few. Where the power is in the few it is natural for them to sacrifice the many to their own partialities and corruptions" (quoted in Hyde 2010:90).

Thomas Jefferson, who was elected the third U.S. president, expressed some widely quoted ideas in a letter in 1813:

> He who receives an idea from me, receives instruction himself without lessening mine; as he who lites [lights] his taper [candle] at mine, receives light without darkening mine. That ideas should freely spread from one to another all over the globe, for the moral and mutual instruction of man, and improvement of his condition, seems to have been peculiarly and benevolently designed by nature, when she made them, like fire, expansible over all space, without lessening their density at any point, and like the air in which we breathe, move, and have our physical being, *incapable of confinement or exclusive appropriation* (quoted in Hyde 2010:90-91, italics mine).

Thomas Jefferson's words could have been written today about the Internet. The issue of access to information and its free movement across the globe was as real in 1800 (though it took weeks for a letter to reach England) as it is in the 21st century. It is essential not to allow our thinking about ideas to be driven by the imagined consequences of technological change. Ideas about ownership are philosophical, rooted in ideas of value, person, and politics.

In spite of Madison's distrust of monopolies, the authors of the U.S. Constitution decided on a limited-term monopoly in order to benefit the common good and to promote the progress of science and useful arts. Article 1, section 8, clause 8 of the United States Constitution signed in this city allows Congress "to promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries." The wording emphasizes the benefit to society of the monopolies, and not their benefit to authors and inventors. This is a very different tradition than the one that stresses the authors' rights, assigns unalienable moral rights, and is identified with European copyright law. The purpose of the U.S. copyright provision was not to protect inventors and writers so much as to ensure a constant supply of new inventions and arts.

The challenge to audiovisual archives is not confined to the arcane details of copyright legislation. Some things that might be legal may not be ethical or appropriate. Archives need to be attentive to issues of cultural rights and social justice. One of the areas in which the international copyright conventions have been criticized is with respect to their treatment of oral traditions and traditional knowledge. Copyright legislation in most countries specifically excludes oral traditions and folklore from copyright. Intellectual property laws were developed in urban areas for urban, literate people working within a market economy. This leaves out a lot of people's knowledge, especially those living in rural areas and transmitting through an oral tradition. Many people around the world complain that they had no part in creating the Intellectual Property laws of their nations and that their own ideas of appropriate control and transmission are flagrantly ignored by national laws and international agreements. For example, not all music is meant to be commercial; it may have spiritual efficacy and be held in secret by distinct groups. Both UNESCO and WIPO are considering ways to protect traditional knowledge and traditional cultural expressions (UNESCO, WIPO). The United Nations Declaration on the Rights of Indigenous Peoples also addresses these issues and will probably affect access to archival collections.

An Australian illustration (continuing the parody of This Land is Your Land)

As I roamed and rambled in the Australian desert
I met a man whose music was secret
He told me it was wrong to pass on his song
To women, children, or anyone of another clan

In parts of Australia and the Pacific Islands, many relationships among social groups are established and maintained partly through *restrictions* to the flow of knowledge according to a person's age, gender, lineage, clan, and other distinctions. How does this work in an age of convergence, when all the knowledge of a group may be stored on a single computer? One of the challenges to control over the distribution of knowledge is that large databases and the Internet make all information available to everyone. Yet databases and the Internet do not necessarily require universal access. Some of the most interesting developments in indigenous rights are coming from Australia, where the rights of Aboriginal peoples are setting very interesting precedents. One interesting project is described by Kimberly Christen (2009), who was part of a team working with the Pitjantjatjara Council on a community archive. Like many other Australian indigenous groups, the Pitjantjatjara distinguish social groups and relations through restrictions on knowledge transfer. She reports that they established a system in which every member of the community has his or her own individualized login and password. Once logged into the main computer, that person would only be able to access information appropriate to his or her age, gender, and social group. Each person also has a space to assemble those parts of the appropriate knowledge desired for learning. In this way the community can document its knowledge and preserve it for the future in a digital form without abdicating their ideas of appropriate knowledge ownership. Younger members of the group will be encouraged to access those parts of it they are eligible to learn in a way that helps ensure a distributed transmission of the community's knowledge.

The Pitjantjatjara Council's project presents a direct challenge to the idea that convergence and the Internet will create a vast pool of knowledge for everyone. And they are not the only people who would like to keep part of their knowledge out of the general pool — witness the problems young people in the United States are having with Facebook pages that document their youthful exuberance but are later studied by potential employers. I suspect we are at the very beginning of an evolving set of ideas and practices about information access and the Internet, and that some changes may occur irrespective of changes in intellectual property legislation. Yet as we enact convergence we may find an increasing need to establish different standards of access and use, and ones that may not involve copyright law at all. Convergence of several media formats into one package can also create extremely complex issues of use rights.

Diversity of metadata

Our wires and films and tapes are all through
We must move them to digits, it's all we can do
But data need metadata — and specialists too
Or all of our work will have been to no use

Chorus: It will be
Lost, lost, forever, no images and no sound
No one can use them because we have fused them
The public has lost out for good

One result of the separation of different media formats into separate archives and different academic fields has been that different approaches were developed for cataloging and studying them. The study of sound, of still photographs, and of moving image, has each become quite specialized. Each field has developed its own approaches to the material. In our approaches to convergence it will be very important not to lose the distinctive perspectives of these fields of study. We must be careful not to throw out a century of reflection about each of the converging media in our enthusiasm for compacting them. This means we will have to think long and hard about what kind of metadata and associated data need to be attached to the digital files.

While it is fairly easy to agree on the importance of metadata about format and technical details, there is a lot of variation in the other kinds of data considered important or even essential to each format. Sheet music and most popular music recordings have distinctive and fairly standardized metadata — composer, publisher, genre, date and place of publication. This information can be automatically harvested from online databases. But if you add Brazilian Indian song to this there may be many performers — and instead of individuals a community name will be needed. There may be no human composer — many kinds of music are revealed to humans by spirits. Many songs have no identifying title, and dozens of distinct songs may have the same title, such as *agachi ngere (*rainy season unison song), which is spelled different ways at different times. In recordings sound quality and completeness are essential information. Photographs and moving image add yet more dimensions. The EVIA project at Indiana University has experimented with a way to get similar data about moving image by training researchers to annotate their own videos using specially developed software. The project has developed some very interesting methods for acquisition, entering metadata, preserving the originals, and making the information accessible for educational use that are worth studying (EVIA 2010).

Today, people around the world are texting, sampling, making mashups, blogging, and posting text, sound, and videos in previously unimaginable numbers. Everyone who can access it is looking for information online as well. We have a huge challenge before us, and real opportunities as well. Today, archives need not provide all the information — what is missing may come from users. There are opportunities to do collaborative, "crowdsourced" collecting and documentation. Some of these opportunities are beginning to be tried. Both the British Library and the Memorial University of Newfoundland have posted large collections of folksongs online. Both began to receive new information about the material they had posted, including the names of people in old photographs, additional information about the songs and the performers. Archivists used to have a difficult choice between access (which often damaged the collection) and preservation (which made collections less accessible). Today, access can improve collections.

Conclusion

IASA and AMIA meet for convergence and fun
To ensure access to collections before they are gone
But now it is time, I have a hunch
To end this keynote and all go to lunch

Chorus: Or we'll be
Lost, lost forever, talking on and on
We must eat and drink hearty
To remind us as we party
That life before divergence is fun

In conclusion, let me review some of the main points I have made in this paper:

1. The variety and diversity of human societies and languages is a great strength of humanity, and a huge challenge to efforts at convergence.

2. The desire of peoples around the world to document their lives for access by future generations may well come to nothing because there is no parallel effort to preserve and migrate the data being recorded on hundreds of millions of recording devices. Archives face huge challenges with dwindling budgets and reduced staff.

3. The aspects of human experience and expressions that we can now record are only fragments of the totality of a live event. Our recording devices are relatively recent, and will be considered to have been very primitive in a few decades. The modalities of recording will probably change; aromas, sensations, and emo tions may eventually be recorded as well. Thus whatever convergences we have now, we will have to add new kinds of data in the future. Our systems should be designed in a format open enough to allow the inclusion of new kinds of information, not limited to what now exists.

4. Our efforts at convergence will have to overcome some serious challenges, including
   a. What to call things and how to create systems that can handle the diversity of materials we are converging.
   b. Challenges of software and hardware obsolescence will plague us. Individuals and institutions that adopt new formats or make special adjustments to software may find they have wasted large amounts of time, energy, and money. The anguish that accompanies these experiences can be reduced if we communicate with each other and try to avoid making the same errors more than once.
   c. Issues of intellectual property and ethics complicate convergence and are both "moving targets" in the sense that they change even as we are trying to comply with them. (That's one reason why we attend IASA conferences.)
   d. The diversity of the kinds of metadata — the data about life's experiences and how to associate it with the converged recordings — separately developed for each medium will challenge efforts to consolidate them.

5. Collectively, those of us in AMIA and IASA are making some progress in addressing many of these challenges. But many of these things are constantly changing: by the time we have figured out how to manage them, they will have changed again.

Although we may not be able to achieve full convergence, our efforts will be appreciated by future users. But the process will be frustrating and incomplete. Whatever we come up with will require reformulation in the future, so we must also ensure the training of future generations of archivists. But I also suggest that part of the challenge before us in the coming days of the conference (or whenever these words are read) is to live with all of our senses, and to appreciate fully those things we cannot yet completely record, archive, and converge.

Thank you.

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A NEW SYSTEM FOR THE SURVEILLANCE OF ANALOGUE PLAYBACK DEVICES

Timo Meyer and Jörg Houpert, Cube-Tec International GmbH, Bremen, Germany

Introduction

When large amounts of analogue sound carriers need to be digitised, a significant improvement of quality surveillance as well as time savings can be achieved by the use of modern technology, especially when collections are recorded in standard formats and if they are of mostly homogeneous technical quality. Mass digitisation very often relates to the unique media of our audiovisual heritage. Furthermore, for reasons of cost and effort, the transfer of these media can be done only once. That is why precise and efficient quality assurance actions are essential.

These actions can be classified into methods of quality assurance, which include securing the best possible signal path – such actions are taken before the actual recording — and methods for quality control which are taken during and after the recording process.

Detection of transfer-related errors is of high priority in mass digitisation, because where such errors occur, the technical quality of the archive file is reduced compared to the physical carrier. Of less importance is the detection of media errors (errors that are already present on the physical carrier), as such errors cannot be avoided during the digitisation process — they can only be logged.

The following will show how existing methods of quality assurance can be optimised by employing a new system which helps to ensure the integrity of the signal path by automatically evaluating reference recordings. When describing these methods and approaches, the focus is set on recurrent procedures. Obvious quality influences such as the qualification of employees, the definition of appropriate practices/the adherence to these practices, or simply the quality of the playback devices in use are not further described.

Quality assurance through optimising the recording path

Measures that are taken prior to an audio recording in order to improve its quality are generally related to quality assurance. One such measure is the optimisation and maintenance of the recording path.

The signal path consists of different single devices when digitising analogue sound carriers. In most cases the signal path is a series connection of the following components:

- analogue playback device
- analogue-to-digital converter
- audio interface
- recording software

Analogue playback devices are usually the most error-sensitive components in a digitisation system. It is therefore essential to regularly service and calibrate these devices. Additionally, the whole signal path should be controlled in regular intervals by using reference signals. Executing and evaluating such measurements is time-consuming and often involves a considerable technical outlay, plus it requires qualified personnel. For the determination of different relevant parameters it is usually necessary to carry out measurements with different test signals or media, and partially different measuring devices.

However, cleaning the tape path of reel-to-reel and cassette-tape machines can be undertaken by the operator. Depending on the quality of the archived tape material, cleaning should be done up to several times a day. As every practitioner knows, even playing back a single tape can leave remnants on the tape head, thus causing sound quality deteriorations for subsequent playback.

Cleaning or physical restoration of sound carriers — as is often necessary with records — can also be assigned to the category of quality assurance.

New system for surveillance of playback devices

In practice, the great effort inherent in quality assurance in the form of regular alignment of analogue playback devices is a big problem. Together with the need to exclusively employ experts for this task, the activity often leads to a drawn-out maintenance interval which makes it impossible to get safe statements about the condition of the devices.

This security gap can be bridged with the help of a new system which is based on the automatic analysis of a recorded reference signal. It is achieved by using a special test medium containing a defined sequence of different test tones. Depending on the playback device, these tones can be on tapes, compact-cassettes or records. Special software takes care of the recording as well as of the automatic analysis of the reference signal passing through the signal path. In this way, numerous variables characterising the condition of playback devices can be determined within a short period of time. Provided that reference media are of high quality, very precise measurements can be achieved. The system, called "Calibration-Inspector", is capable of measuring quantities such as, amongst other things, frequency response, speed deviation, wow & flutter, distortion, azimuth, stereo balance, cross talk and signal-to-noise ratio.

The option of parallel reference signal recording from multiple playback devices and the short analysis duration, which mainly depends on the approximately two minute reference signal, allow for checking analogue playback devices at short intervals — e.g. daily. The surveillance of reel-to-reel machines, cassette decks and turntables therefore becomes independent from alignment procedures which are completed at longer time intervals. In addition, this quasi-continuous monitoring does not only indicate when a calibration is necessary, but it also provides valuable information for the service technician in order to achieve an optimal alignment of the devices. By filling the gaps between the maintenance dates, it is possible to avoid recording audio material over a long time while using machines that do not meet the required quality criteria.

Figure 1 illustrates the security problem that occurs when maintenance is performed at large time intervals only. The security once attained after alignment decreases over time (front graph), so it is impossible to make any safe statements about the integrity of the recording path between maintenance dates. Even though the analysis during a device calibration allows for drawing conclusions about past recordings, the consequence of this information should possibly be a re-digitisation of the archive material recorded in the previous days or weeks. This would lead to enormous additional costs, and could be avoided with the new system by performing a preventive analysis of the signal path (rear graph) — the security gap would be closed.

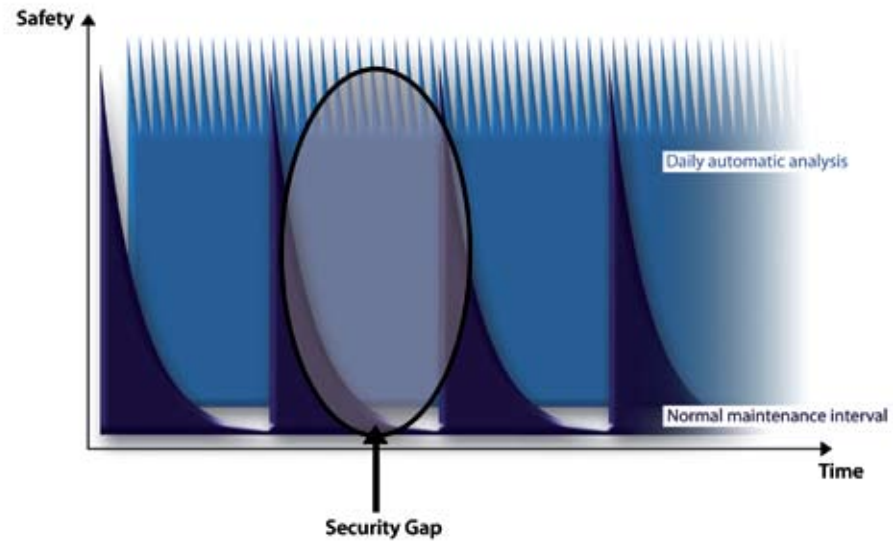

Figure 1. Security gap when maintenance is performed in large time intervals (front graph) and prevention of this problem through the use of a system for automatic, reference-based condition analysis (rear graph).

Suitable professional playback machines have not been produced for a long time. In the case of reel-to-reel machines, most of these machines are between 20 and 40 years old. In a mass digitisation project they are operated for up to 12 hours per day. So monitoring the condition of these machines should be taken for granted. Until now, there have not been any adequate solutions to close this dangerous quality management gap in a satisfactory way.

The system presented also allows for automatic examination of compliance with a defined quality standard. The user can set two tolerance values with different priorities for all available parameters — or only for those of interest — within a tolerance scheme. After analysis, the present measurements are compared to the values that were defined in the tolerance scheme in an evaluation process and are displayed on a unified percentage scale. The additional application of a traffic light style visualisation helps with maintaining an overview of the compliance with the tolerances.

Figure 2. Principle of an automatic, reference-based condition monitoring of playback devices.

Figure 2 schematically illustrates the principle of function of the "Calibration-Inspector" system. Both the measurement values determined during the analysis and the results of the evaluation are saved in a report file.

Another interesting feature of this system is the possibility of long-term evaluation and documentation of the results. By graphically displaying the measurement results over a longer period of time, subtle effects as well as creeping deterioration become visible and the comparison of different machines is made possible. Statistical evaluation of long-term data may provide insight into coherences which otherwise would not have become obvious.

As an example, Figure 3 shows the speed deviation measured for six different reel-to-reel machines in percent over a time period of six weeks. The applied tolerances are displayed as different coloured areas in the background of the diagram. The user can see at a glance if the chosen tolerances have been fulfilled.

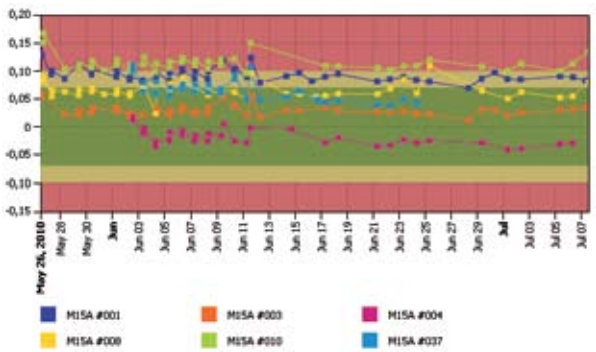

Figure 3. Speed deviation in percent, measured for six reel-to-reel machines over a time period of six weeks.

The advantages and disadvantages of the system for automatic, reference-based condition analysis of analogue playback devices are summarised as follows:

Advantages:

- efficiency: the controlling process does not require specialised personnel; time effort is reduced to the length of recording the few minutes reference signal
- precise measurement of different technical quantities
- automatic monitoring of adherence to self-defined tolerances
- indicates the need for maintenance
- provides valuable information for alignment procedure of playback devices
- automatic condition documentation of playback devices

Disadvantages:

- test media only available in common standard formats
- lifetime of test medium is limited
- quality of test medium has impact on the final result
- when dealing with strongly inhomogeneous archive material, most of the parameters are not of great interest, because individual adjustment of the playback devices is necessary for each variable.

Certification of digitisation services

Based on the presented measurement procedure, a certification service was developed. This service allows for the continuous monitoring of measurement parameters of analogue playback devices. The service can on the one hand be used for internal quality management. On the other hand it can also become part of contracts between sound carrier owners who are striving for mass digitisation through outsourcing and service providers that offer this digitisation service, and then be used as a means for quality surveillance.

If, for example, an archive is planning to outsource the digitisation of a large tape collection, it is now possible for the first time, through the use of the above mentioned system for automatic, reference-based analysis, to explicitly define the expected quality of the digitisation within the respective service level agreement (SLA). In contrast to general regulations which, for example, regulate the use of certain playback machines or the frequency of maintenance, additional objective aims or tolerances for the measurable audio quality parameters can be defined and efficiently controlled throughout the digitisation project.

Defining tolerances for a minimal acceptable signal-to-noise ratio or the maximum possible wow & flutter values for reel-to-reel machines ensures a monitoring of parameters which is not possible when using conventional methods.

Controlling whether the service provider adheres to the predefined guidelines can be realised through a respective online service. It is necessary, however, to ensure an automatic and safe transfer of the quality measurement data from the service provider to the online service platform. After evaluating the measurement data by reference to the tolerances defined in the service level agreement, a quality certificate for the ingest of recordings within a defined time period is awarded. The frequency of analysis is defined in the service level agreement. As a standard, the measurement has to be completed once a day. In order to simplify the SLA draft, universally applicable descriptions of the service level quality guidelines are available and can be used within the scope of, for example, tenders for digitisation outsourcing.

Both the archive and the service provider are given an insight into the measurement data of the playback machines in use. By means of a web-based quality management system (QMS) provided by the system, both parties can participate in the controlling process and are able to view detailed reports.

Figure 4 shows a schematic of the interactions between the outsourcing archive and the digitisation service provider.

Figure 4. Quality control when digitising analogue media with the help of an online quality certification service.

The employment of such an online certification service provides benefits for both parties: archives obtain a quality assurance instrument for the recording of their media. In the past, sound carrier owners had to implement quality control by means of a cost-intensive strategy: multiple recording of a single sound medium and time-consuming comparative analysis. The availability of objective measurement results allows for a drastically simplified quality monitoring.

For companies or organisations dealing with the process of mass migration of analogue media, long-term evaluation is an important tool for supporting the continuous internal improvement process. For example, slow deterioration over time can be made visible. Besides the cost savings due to precise situation assessment, there is another advantage for service providers: when using playback devices of different quality, it may have been difficult to argue the higher costs for recording with high-quality machines to their clients. With the help of the automatic, reference-based analysis, quality differences between average and high-class playback devices become easily measurable. By documenting the measurement results, the client can easily see the quality difference between different machines. The SLA guidelines can therefore offer different service levels, thus enabling a quality based pricing system. The adherence to the agreed service level can be proven to the client with the online service. For quality-conscious service providers this opens up new opportunities to set themselves apart from competitors that operate with a less than convincing quality management system.

Summary

The use of a system for the automatic and reference-based quality surveillance of analogue playback devices represents an efficient means of quality assurance when digitising audio media. The method therefore contributes to the preservation of our acoustical heritage.

The quality of digitisation can be markedly improved by this newly obtained control option, provided that a sufficient homogeneity of archive material is given. With extensive automation of the measurement procedure, the ratio of achievable quality to cost or duration of the migration project is improved significantly.

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VIDEO DIGITIZATION AT THE AUSTRIAN MEDIATHEK

Herman Lewetz, Austian Mediathek[9]

In September 2009 the Austrian Mediathek started a project called "Österreich am Wort". Its goal is to digitize and publish via the web about 10,000 full-length recordings within three years. The misfortune for me personally was that in the proposal for this project someone had claimed 2,000 of these to be video recordings. This meant I had to start what we so far successfully had postponed: Video digitization.

Requirements

As a first step, we outlined the requirements we thought important for a digitization schema that best supported long-term preservation. Unlike audio digitization there is still no widely accepted archive format for video.

- **Lossless format**
  The most important requirement for the archive format is that it is absolutely lossless. It is clear that if the content is expected to last forever, it must undergo endless instances of conversion into future formats. Therefore each loss in quality, even if it is minimal, would lead to a total loss of content at the end of the migration chain.

- **Non-proprietary codec**
  The codec must not be proprietary. It must be capable of being used by any programmer for implementation in any program that is intended to deal with it.

- **Hardware independency**
  Video playback shouldn't depend on dedicated hardware. This would limit the use of programs to those that can deal with the dedicated hardware, which in many cases would be proprietary software.

- **Reduced data**
  Calculations have shown that video digitization produces a huge amount of data. Although the prices for storage decrease steadily, the costs are still very high. Calculating in these dimensions, the chance to cut them in half it becomes an important argument.

- **Metadata**
  Documenting the whole process of digitization including metadata of all tools used and their configuration is important for later research.

- **Affordable system**
  Only a small portion of the budget could be spent on video digitization at the Austrian Mediathek. There was only a limited funding for the project "Österreich am Wort". Therefore, the system to be installed for the video digitization had to be cost-effective.

As a last requirement we tried to follow the basic strategy that simplicity makes life easier.

9 The author wants to thank Peter Bubestinger, who did all the scripting for this project, and made the concept of this project grow from the simple idea of a script to a complete system. I also want to gratefully mention Christopher Maines, who helped to prevent me from accidentally writing nonsense because of my ignorance of the English language.

Known alternatives

When you remove all lossy and proprietary codecs from the list of known available video formats there seem to be only two alternatives remaining:

- **Uncompressed**
  Uncompressed formats require a huge amount of storage space, which eventually means limiting the overall digitizing efforts.

- **Jpeg2k**
  This codec wrapped in an mxf container was considered to be an excellent solution for a video archive format in many discussion circles and was, therefore, our favorite solution until we made tests to deal with those files. Many of the few existing applications, which claim to deal with this format, only are able to decode the file. Others cannot handle the mxf container. It also seems difficult to play back a lossless jpeg2k file properly without dedicated hardware. This dependency on hardware makes jpeg2k (a primary open source format) partially proprietary.

Both known alternatives are at least viable possibilities for storing video content without facing a loss in quality through successive migrations. But none of them fulfills all of the requirements as stated previously. Although they seem to represent a serious solution for a long sought reliable format for long term video archiving, many technicians do not seem to be completely satisfied with them.

Our decision

During several months of testing and research we also looked into open source solutions. There, we found a huge range of formats and codecs including some unknown to us, but seemingly suitable. The fact that almost all programs in the open source community dealing with audio and video rely on the libavcodec library, which is part of the ffmpeg project, makes all the codecs and containers, which are implemented in that library, well distributed among available open source tools. This library is so open, free and well-known that some commercial vendors have even decided to implement it in their products. Thanks to wrapper applications for several different operating systems, the library's multimedia codecs can be used by any application that support the use of external codecs. On the Microsoft Windows platform, for example, one can use "ffdshow-tryouts", which makes the libavcodec available as VfW (Video for Windows) and DirectShow codec. After a successful installation, all applications, which are able to deal with system codecs — whether they are free, open source or commercial, now also can handle all formats and codecs inside this library.

One of these codecs, which is part of the ffmpeg library, is the so-called "FFV1". It is a codec with a mathematically lossless compression. It decreases the amount of data down to almost 30 %, which is comparable to jpeg2000. It is capable of dealing with all current color spaces like YUV, YV12 and RGB including subsampling (4.4.4, 4.2.2 and so on). Even the resolution was independent. We tried PAL 4:3 and 16:9 as well as HD 1980 x 1080. However, we made no tests with NTSC. As the Austrian Mediathek is located in Europe and is a national AV archive, we have only video with the PAL standard in our collections. Tests with NTSC would be part of future investigations.

The great advantage of the FFV1 codec is its comparatively low demand on processing power. We managed to achieve proper recordings without adding or dropping frames using a standard PC. Even the playback was performed properly without breaks buffering.

The choice of the video archive format was the first step. The few available video digitization systems at this time are not able to deal with the ffmpeg library. Therefore we decided to use existing open source software and develop our own idea of a video digitization system.

The system

Video-Cube (ingest machine):	Ferry (automation server):
Standard PCs, Dual-Core, 2.3 GHz, Intel I5, Decklink SDI card	Standard PCs, Dual Core, 2.6 GHz, Intel I5
Windows 7	Debian Lenny (5.0.4)
ffdshow-tryout	encoding: Mencoder, FFMPEG
VirtualDub (Open Source capture software)	analysing: Shotdetect
	script: PHP

Besides the Decklink card we used only standard hardware. At the moment we have in use three machines for capturing the video and two ferries, which perform all automated tasks in the background. Both sides can be altered by additional machines.

- **Script language**

The code is written in PHP. In order to only have one programming language across the whole project and because it is easy to learn and is in widespread, PHP was chosen for implementing the browser-based GUI and the workflow processing applications running in the background. The script itself is the source code.

- **File-based solution**

Following the concept to introduce the simplest possible solution, we decided not to use any database. Instead, all the needed information and created data is just stored as files in an organized system of folders. For example, the metadata describing the workflow is an XML file enriched with additional information by every successive task in the row. This file gets passed from task to task. The Ids, you see in the frames of the HTML page (GUI), are actually the names of listed XML files situated in the dedicated folders. Thus, at every stage it is possible to check the actual status of the recording. (Figure 1)

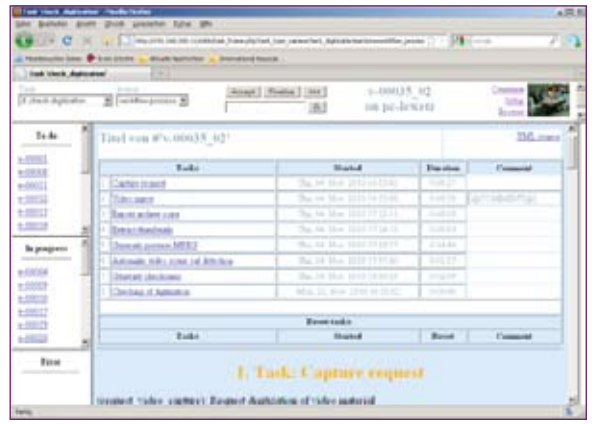


Figure 1. This view gives reference of the performed tasks, their parameters and their individual periods.

- **Simplified architecture**

The other simplification is represented by the fact that each of the PC machines is dealing with just one task at a time, although they technically would be able to perform more than just one

process. Thus, maintaining an overview of which task is performed by which machine can be achieved with less complex scripting. On the other hand, this concept increases the number of PCs in use. However, the included hard drives also alter the available data space, which makes any need of extra storage obsolete.

- **Capture**

For the ingest of an SDI video stream, we use the application called "VirtualDub". It runs on MS Windows. Having the ffmpeg library installed, it enables the application to capture natively with the ffv1 codec wrapped in an AVI container. Thus, we avoid the time and resources normally used for conversion into the archive format. VirtualDub also gives us the ability to segment the files in accurate length.

- **Segmented archive file**

Our system is designed to accept each recording as a bundle of segmented files. We decided to split the video into 1-minute file segments. Using the PAL system in Europe, this translates to accurate 1500 frames per file.

The main reason for dealing with segmented files lies in the attempt to reduce the load of the intranet and the storage environment and achieve a more fault tolerant procedure. In case of failures, having smaller files reduces the amount of data that has to be restored. For example, creating individual checksums for each minute makes it possible to identify and replace a smaller piece of faulty data.

- **Metadata**

All Metadata are written in an XML file, which is defined using the METS schemas. To achieve this was one of the most time consuming efforts.

It is our aim to register our system with the official METS page. Following the METS standards enables many other institutions that have also implemented METS schemas in their systems, to interpret our metadata without complicated matching procedures and vice versa.

- **Web browser GUI**

The GUI, which shows all tasks, statuses and actions, is a simple HTML page. In order to support as many browsers as possible, the HTML code was kept straight-forward and simple, using only well-known and established HTML elements. The use of Javascript was kept to a minimum and is not required for essential functions of the GUI.

Watching and navigation of the complete workflow is organized in this one page. It is designed to make only those items available, which are needed at the actual stage of the workflow.

The page is divided into 5 frames. (Figure 2)

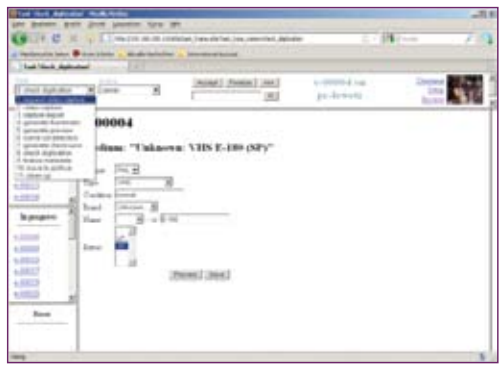


Figure 2. This dropdown shows the actual installed tasks. When a task is selected, the frame changes to a view of the dedicated task.

The upper frame of the window shows the navigation menus and action buttons for accessing, finalizing and eventually resetting tasks. Buttons are only active when the tasks are in the appropriate context.

The left menu shows all installed tasks, which can be chosen by clicking. The content of all frames then relies on this dedicated task.

The second menu offers a selection of different actions depending on whether they are available in the chosen task.

The left column is divided into 3 parts:

- **"to do":**
  The text file of all recordings, which are ready for the actual task, wait inside the frame called "to do" until accepted.

- **"in progress":**
  When accepted for processing, the text file gets moved into the frame called "in progress". Then the dedicated task starts.

  When finished, the button "finalize" starts the finalizing procedure. All relevant files created in this task get moved into the task folder „finalized" and the text file gets moved into the "to do" folder of the next task.

  Depending on the character of the task, activating the "accept" as well as the "finalize" button can happen automatically or can be done manually.

- **"error":**
  Any errors occurring during processing move the file to the "error" folder modified with the appropriate error message. It appears in the frame called "error". It will stay there until it is manually reset. It then jumps back to "to do", where it waits until being accepted again.

In fact, the visible recordings are nothing else than the names of metafiles in dedicated folders. This means the information illustrated on the page is generated by simply summarizing the content of the dedicated folders "to do", "in progress" and "error".

These metafiles start with the metadata coming from the catalogue and become modified with additional processing information from task to task. After a task is finished and the button "finalize" has been activated, this file will move to the next task.

The middle frame shows the content of files, which have been created during former tasks of the selected recording. It varies with the selected action.

An overview shows all existing recordings and their individual status. There, they can also be processed as a batch. (Figure 3)

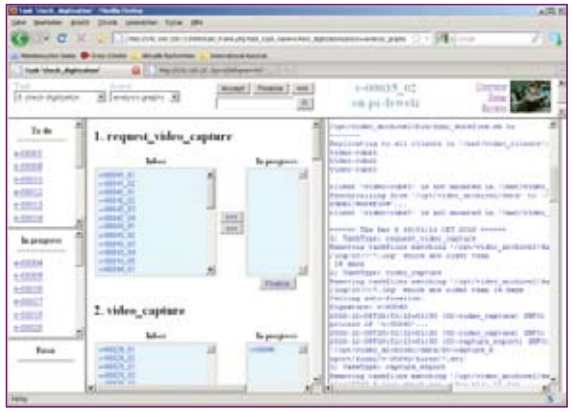


Figure 3. This overview enables monitoring and administration of the tasks in common.

The workflow

For descriptive metadata we use an independent catalogue database. The workflow starts after the cataloguing. An automated export stores a text file with dedicated metadata selected from the record in the catalogue into a specified folder. A script continually looks for text files in this location and eventually parses them.

When such a text file has been acknowledged and parsed, the ID of the recording to be digitized appears in the "to do" frame of the first task called "request". This ID actually is the filename of the text file, which then becomes modified with additional information from task to task.

In the first task called "request", there is a small text box where some technical information about the cassette has to be entered, which might be important for later research. The fields to be filled in vary with the format and its specifications. (Figure 2)

After successful digitization, the next tasks start automatically. The recording is analysed, thumbnails are created, metadata are collected and an mpeg copy is made. This takes some time so the manual check has to wait until the next day. Fortunately we can continue for the day with digitizing additional recordings.

Different views are available for checking to see whether the digitized recording was a success or should be redone for any reason. (Figure 4 and Figure 5)

Figure 4. This is the view of the detected shots. It shows some results of the detected cuts and transitions. The larger picture on the top represents the activated thumbnail below. In addition, the application also detects any extant picture errors, interprets them as cuts and creates thumbnails, as it does with all normally detected cuts. Thus, many failures become visible at a glance.

Figure 5. These two graphics are created by the shot-detect application during the analysis. We combined and synchronized them in the browser. Slewing through these traces gives us much information about the condition of the file. Parts in doubt can be viewed in a video player by clicking onto the curve.

When the recording passes all checks successfully, all relevant files get moved automatically into the defined storage folders.

The final task is to clear the system of all remaining files and folders, including involved ferries and the ingest machine. This is important to make space for the next recordings.

All tasks used in our system are installed as individual modules. They can be replaced or altered by other tasks. This enables us to vary the system if needed.

Publishing the system as open source

A description of this system, including this article, is accessible on our website: http://video-digitalisierung.mediathek.at

The next step, to take place in 2011, will be a systematic publication of the entire project on our website. The scripts, documentation and descriptions will be published under the GNU General Public License (GPL). Our intention is to give back code, which we used for free from the internet, enriched with our input. We took some individual applications and are giving back an entire system. All applications, which we had to modify, did not just become orphaned versions for our own use. Depending on the development structures of external tools, we're not only sending our changes back to the upstream developers, but we are also collaborating with some of them, as well as directly committing into the official source tree. In another case we were successful in getting the developers to take our needs into account during their future development. The original FFV1 codec is not able to deal with more than 1 core. This will be changed in future updates. Triggered by our request, the developers have already started working to modify the FFV1 codec for multithreading. Tests show that the processing will be much faster and that files processed with this codec can run on even less powerful PCs.

Conclusion

The primary and most important messages of this project paper can be summarized in two statements:

- There is a third alternative format for long-term video preservation.
- There is a system available as open source software that is able to deal with a huge number of video formats, including this third alternative, and that helps to organize the complete workflow from digitizing through analysis and documentation to archiving. (http://video-digitalisierung.mediathek.at)

Our results might assist other institutions in deciding how to preserve their video content. For the Austrian Mediathek this decision has been made. For us, the FFV1 codec is currently the most complete solution, and practice shows that our system is a professional alternative to commercial solutions. If other reliable codecs become available or the jpeg2k codec fulfills its potential, which it already claims to do but in fact does not, the FFV1 codec would enable us to migrate to these newer codecs at any time and losslessly. The question is: Will there be any need to do so?

THE CNRS — MUSÉE DE L'HOMME AUDIO ARCHIVES: A SHORT INTRODUCTION

Aude Julien Da Cruz Lima, Centre de Recherche en Ethnomusicologie (Research Center for Ethnomusicology, CREM-LESC-CNRS, France)

The historical and institutional context

The CREM works on the preservation, documentation and dissimination to a global audience of one of the greatest archives of ethnomusicology in Europe. The *Centre National de la Recherche Scientifique* (National Center for Scientific Research, CNRS) and the *Musée national d'Histoire Naturelle* (National Museum of Natural History, MNHN) share the property of the archives, supported by the *Ministère de la Culture* (Ministry of Culture) and the *Université Paris Ouest* (Paris Ouest University, formerly called Paris 10 University). These audio archives[10] were founded by the french musicologist André Schaeffner in 1932, returning from the Dakar-Djibouti expedition (directed by Marcel Griaule) in 1931 in Africa where he collected both musical instruments and records. The sound archives and the organology department were named *Département d'ethnologie musicale*[11] (Department of Musical Ethnology) of the *Musée d'Ethnographie du Trocadéro* (Museum for Ethnography at Trocadero square, next to the Eiffel Tower), then *Musée de l'Homme* (Museum of Mankind) in 1937. In 1968, under the direction of the French ethnomusicologist Gilbert Rouget, the department became the *Laboratoire d'ethnomusicologie* (Laboratory of Ethnomusicology) of the CNRS. Since 2007, after integrating the *Laboratoire d'Ethnologie et de Sociologie Comparative* (Laboratory for Comparative Ethnology and Sociology, LESC), the team is now called *Centre de Recherche en Ethnomusicologie* (Research Center for Ethnomusicology, CREM). In 2009, the CREM left the museum, under construction, to be hosted at the *Université Paris Ouest* in Nanterre (in western suburbs, next to business center *La Défense*).

The Collections: historical and contemporary records

Since the foundation in 1932, this archive has been closely related to scientific research and a large number of historical records have entered the collections. These include Schaeffner's cylinders recorded during the Dakar-Djibouti expedition, lacquer discs recorded by Gilbert Rouget during the Ogooue-Congo expedition in 1946 with the first records of pygmy music, and our first magnetic tapes recorded in the field by Gilbert Rouget in 1952 in west Africa.

Today, this audio archive constitutes a major human cultural heritage, with more than 6000 collections. It includes about 3700 hours of commercial records; nearly 5000 discs. some very rare; and about 3800 hours of unpublished records (made during fieldwork and other expeditions). The archive, still expanding and supporting contemporary fieldwork, is acquiring more and more audiovisual and digital formats. Most of the collections are of traditional and popular music, but they also feature oral traditions and spoken word from around the world and in numerous languages.

Some of the fieldwork recordings began to be published in the 1940s in the "Musée de l'Homme" then "CNRS-Musée de l'Homme" collections. Now, there are about 150 references published on several types of disc, making up some some very famous series, such as "Voices of the world" or "Musical instruments of the world". All these references are now out of print and are no longer available to the public or libraries.

10 For more informations on the history of the audio archives, see Pitoeff, Pribislav, 'Histoire des archives sonores du musée de l'Homme', ***Annuario degli archivi di etnomusicologia dell' accademia nazionale di Santa Cecilia***, 1.1993, Libreria Musicale Italiana, pp 143-149.

11 For more informations on the history of department, see Rouget, Gilbert, 'Le Département d'ethnomusicologie du Musée de l'Homme. Maison mère de la discipline en France et dispositif en péril', ***L'Homme*** 2004/3-4, No.171-172, pp 513-523.

The unpublished records also cover a wide range of carriers now preserved by the Audiovisual Department of the French National Library (Bibliothèque nationale de France). These include our oldest records — 400 cylinders recorded by Léon Azoulay (from the Anthropological Society of Paris) at the Universal Exhibition in Paris in 1900 —, the lacquers discs recorded directly in the field during the 1940s and 1950s, and of course magnetic tapes, recorded from the 1950s to the 1990s.

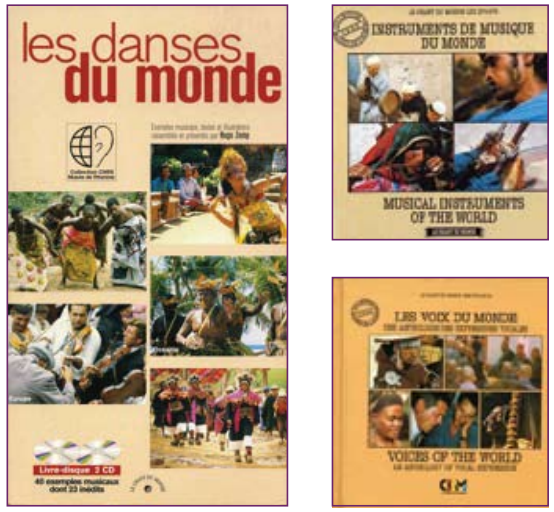


Figure 1. Published series from the CREM collections © CREM – Le chant de monde

telemeta

TELEMETA: an audio Content Management System for the Web

Joséphine Simonnot, research engineer, CNRS, Research Centre for Ethnomusicology[12]

Researchers in the field of humanities disciplines such as anthropology and linguistic, work with a wide variety of documents including pictures, sound recordings and videos. The time-based nature of these audiovisual materials raises issues of access and visualization. As these resources are research materials, it is important to allow their access and management, as well as their preservation and distribution. For sound recordings, it is essential to manage the sounds together with their associated metadata, to enrich them and to facilitate access to them.

As there was no open source application available on the market, the CNRS Research Center for Ethnomusicology (CREM), the Laboratory of Musical Acoustics (LAM), and the Sound Archive of Aix-en-Provence (MMSH), have been working together since 2007 on the design of an innovative, collaborative and interdisciplinary tool. For these teams, whose core activity is to work on and manage sound records, the project had a double mission: to meet their specific management needs and also to satisfy the demands of the research sector.

The multimedia Web application TELEMATA has been on line since 2008. It is specifically designed to give access to audio archives and their associated metadata, to facilitate the work of researchers and to enhance the availability of data from the database catalog, according to common standards and interoperability.

12 Contacts: Joséphine Simonnot (CNRS-CREM) josephine.simonnot@mae.u-paris10.fr; Guillaume Pellerin (Parisson – Telemeta) guillaume.pellerin@parisson.com

Edit view:

The main features of TELEMETA are:

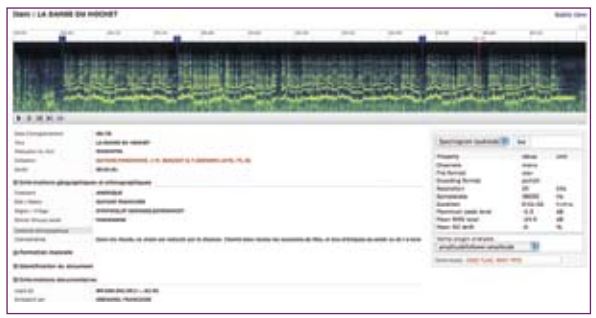
- User-focused web front-end supporting workflows,
- Advanced search methods with thesaurus,
- Dynamic audio player,
- Immediate audio analysis, transcoding and metadata embedding, based on easy plug-in architecture,
- Multi-format support: FLAC, OGG, MP3, WAV,
- XML serialized back-up, SQL back-end,
- Long-term preservation of audio files and metadata.

TELEMATA can be easily adapted to the specific needs of each archive and is compatible with other systems through the integration of standard protocols Dublin Core and OAI-PMH.

It also offers user-friendly functions to navigate inside the recordings such as:

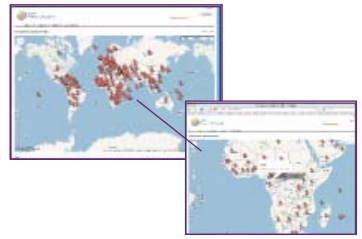
- Visualization of the wave form resized in full screen,
- Navigation within audiovisual files (dynamic head player),
- Acoustic analysis tools (spectral view),
- "Markers" with annotation to identify special events in the audio files (segmentation).

Spectral view with markers:



The online sharing of data and annotation allows all the different persons involved in a specific research project to collaborate and to optimize the enrichment of the metadata.

TELEMETA also allows the geolocation of records through the integration of the GéoEthno and GeoNames thesauri.



The application supports export and sharing of data sources, compressed (MP3 & OGG) or not (WAV, FLAC), and the management of access profiles.

The next step is to include analysis tools in order to improve the semantic search, including the detection of drop, tone, rhythm, speech-music segmentation, speech-to-text transcription, recognition of musical instruments family, etc.

The National Museum of Natural History (MNHN) is also involved in the project, as well as the French National Library (BNF) specifically with regards to the preservation of old media.

Prototypes are already online for the CREM, the MMSH, MuCEM and MNHN:

http://crem.telemeta.org
http://mmsh.telemeta.org
http://mnhn.telemeta.org
http://mucem.telemeta.org

Finally, TELEMETA is supported by a national infrastructure for digital humanities (TGE Adonis) and its new search engine, "ISIDORE", specializing in humanities sources, will harvest the data (http://www.rechercheisidore.fr).

For more details, see the wiki of the TELEMATA project: http://telemeta.org

The technologies involved are:

1. **Open Source**
   License CeCILL
   The sharing of resources to ensure long-term development (wiki)

2. **Software**
   Python, Django, TimeSide, MySQL
   Linux, OSX, Windows

3. **Formats and standards**
   Web: HTML, CSS, SQL
   Audio: WAV, MP3, OGG Vorbis, FLAC
   Metadata: Dublin Core and OAI-PMH

HATHI TRUST AND THE CHALLENGE OF DIGITAL AUDIO

Shane Beers and Bria Parker, University of Michigan, USA

Introduction

As a digital repository for the nation's great research libraries, HathiTrust (http://www.hathitrust.org/) brings together the immense digital collections of partner institutions. As HathiTrust makes every effort for the repository to conform to the characteristics of a Trusted Digital Repository,[13] a tremendous amount of work has gone into developing ingest functionalities that analyze Submission Information Packages (SIPs) to determine that they meet a number of standards. The standards include the technical aspects of the digital image files in a SIP (such as resolution, well-formedness, compression type, color and bit depth), descriptive elements of the SIP (including PREMIS preservation metadata and image header metadata), and structural metadata that explain what the digital image files represent and allow software tools to display the images correctly.

Initially, the majority of SIPs being deposited into HathiTrust were books that had been digitized by Google, Inc. The specifications Google uses in its digitization package were worked out collaboratively with Google library partners, resulting in a tightly controlled technical and descriptive SIP. The validation environment employed in HathiTrust was developed around the ingest of book packages digitized by Google and other sources, checking for agreed upon qualities. For some time, this ingest process has worked well in verifying SIPs against set standards, allowing content into the repository when compliant, and reporting when something failed.

The close relationship between Google's standards and the HathiTrust ingest verification process made perfect sense when the majority of SIPs were in a single format coming from a single source. However, the scope of digitization at HathiTrust partner institutions is much broader, as the University of Michigan Library seeks to incorporate time-based media, initially audio, into the repository. Thus, expanding the capabilities of HathiTrust to preserve and provide access to these materials was a logical, and highly desirable, direction to pursue.

Project overview

The audio digitization project at the University of Michigan Library originated out of the realization of the fragility of the various recordings in Library collections, the increasing obsolescence of the technology needed to play the formats, and, most significantly, the desire to preserve the unique items that are a part of the Library's collections. The majority of libraries in the University Library system have sound recordings in their collections. Of these collections, the majority are published commercial recordings. Therefore, digitization and digital preservation would be desired only for the unique items of high research value, and would not be performed systematically. The libraries with particularly valuable sound recordings are the Special Collections Library and the Music Library. Beginning in 2007, their collections were examined and the working group conducted preliminary research on audio preservation. The audio collections were prioritized for preservation based on the research value of the information held on the recordings, as well as the format and physical condition of the recordings.

Collection managers and the Library's Department of Preservation and Conservation contacted the Library Dean's group in early 2008 to solicit support for an audio digitization project. In the FY 2009-2010 budget, funding was provided for a pilot digitization project and a year-long term position was created in July 2009 to lead the organization and execution of the project. As the Library planned to digitize a small number of recordings, the working group decided against purchasing digitization equipment, as the expertise necessary to operate them was not available or too costly to obtain. The group instead drafted a Request for Proposal (RFP) and put the audio digitization project out to bid in October 2009.

Developing the RFP for audio digitization involved an in-depth examination of the current standards and best practice s in audio digitization and digital audio preservation. Several sources were consulted, including IASA TC03[14] and TC04,[15] Sound Directions,[16] and CDP Best Practices documentation.[17] The group also examined project documentation from Columbia University's audio digitization project, and from other universities and institutions.[18] A set of technical specifications for the pilot audio digitization project were decided upon:

- Broadcast Wave Format (BWF) file
- 96 kHz sampling rate
- 24-bit sampling size
- Preservation Master File (an unprocessed flat transfer).
- Production Master File (some post-processing/clean-up of sound)
- Access copy (on audio CD)
- Metadata (forthcoming Audio Engineering Society (AES) technical metadata standards in a METS wrapper, including Dublin Core and PREMIS events.

While developing the technical specifications, the highest priority was creating an Archival Information Package (AIP) that would preserve essential audio information and its associated metadata in the HathiTrust repository. However, throughout the planning and development of this project a number of challenges were encountered.

Problems faced

The HathiTrust shared digital repository was designed to validate, ingest, store, and provide access to digital text and image files. This project is the first instance of time-based media, such as audio, being stored in the repository. While the Library gave financial support to the project, obstacles still existed. First, standards and best practices for digital audio preservation are still being developed. Second, many of the technical, structural, and descriptive characteristics of the audio content did not match the previously developed standards for materials in HathiTrust. Additionally, the philosophies behind the current specifications for text and images and the desired specifications for audio were different and, at times, difficult to reconcile.

One problem faced was the lack of well-developed and widely adopted specifications for digitizing and preserving digital audio. While there has been much development in this area, we had to rely more on best practices and locating a critical mass of institutions doing the same type of work, instead of relying on published standards. Acquiring institutional buy-in was therefore more difficult, as a large set of standards was not available to justify our specifications.

In addition to lacking established digitization standards, metadata standards for digital audio are also nascent. There have been previous attempts to develop metadata schemas (Library of Congress Audio Technical Metadata Schema, New York Public Library Rodgers and Hammerstein Archives data dictionary), but it was felt that what was available was not adequate for capturing all the information that was desirable to collect and preserve. Both the

13 TRAC. (2007). Trustworthy Repositories Audit & Certification: Criteria and Checklist. Center for Research Libraries and OCLC. http://www.crl.edu/sites/default/files/attachments/pages/trac_0.pdf

14 International Association of Sound and Audiovisual Archives and Dietrich Schüller. The Safeguarding of the Audio Heritage: Ethics, Principles and Preservation Strategy ([Canberra] IASA Technical Committee, 2005).

15 International Association of Sound and Audiovisual Archives and Kevin Bradley. IASA-TC04 Guidelines on the Production and Preservation of Digital Audio Objects: Standards, Recommended Practices and Strategies ([Canberra]: IASA Technical Committee, 2009).

16 Mike Casey and Bruce Gordon, Sound Directions: Best Practices for Audio Preservation ([Bloomington]: Indiana University ; [Cambridge]: Harvard University, 2007).

17 CDP Digital Audio Working Group. Digital Audio Best Practices (2006).

18 Columbia University Libraries Oral History Audio Preservation Project, accessed October 24, 2010, https://www1.columbia.edu/sec/cu/libraries/bts/mellon_audio/index.html.

technical and process history metadata for digital audio is more detailed than for what is currently implemented in HathiTrust for text and images. The team examined metadata used in other projects, including the Library of Congress schema and NYPL data dictionary, and opted to use the forthcoming Audio Engineering Society (AES) metadata schemas. While the AES schemas are not final, they are certainly the most comprehensive. The next challenge was to incorporate information described in these schemas and other essential metadata elements into a METS document, including descriptive and preservation metadata about the recordings. As this document would include substantially different information than the METS for other HathiTrust packages, changes would be required to the ingest process that verifies information sent to the repository.

It was particularly difficult to balance a strong desire for consistency in repository packages with what were considered proper digital audio preservation practices. As current digital preservation practices for audio and textual materials differ, there was hesitation in adopting what were considered appropriate digital preservation specifications for the digital audio materials in HathiTrust. For example, there was concern about the number and size of digital files preserved for each AIP. Storing a production master in addition to preservation master was not the practice for text and image packages in the repository. For digital audio materials, it is considered good practice to store a preservation master, which is an uncorrected capture of the original recording. The preservation master can be re-processed in the future, instead of a single processing session permanently determining the audio data in the archival file. It is also considered good practice to store a production master that includes post-processing, such as normalization and some sound clean-up, with the goal of clarifying the information on the recording. Without knowing the audio quality of the recordings, it was difficult to say whether or not post-processing would be a vital part of the project, or if the production masters would be significantly different from the preservation masters. These concerns made storing both preservation and production masters for the pilot project especially important to the project team.

The HathiTrust repository software uses server-side processing to create access derivatives that are displayed to users as they interact with book packages via a Web browser. Therefore, these access files are not stored along with the other files in the individual book packages. For audio, the original intention was to store an access master in the repository in mp3 format in addition to the preservation and production masters. However, access methods for streaming audio and displaying metadata to end-users via the HathiTrust Web interface did not exist, and were not a part of the pilot project. Without streaming access a decision about a method for giving users access to the content had to be made. As copyright is a potential issue with some collections, having streaming access was not a priority for the pilot until more work could be done to ascertain copyright status for these recordings. Although streaming access was not a task outlined in the pilot project, the lack of these methods has delayed ingest of digital audio SIPs because of the inability to actually provide the information to users.

In addition to not matching existing repository conventions, storing two sets of BWF files per AIP created issues related to repository storage space. While the average size of a text AIP is around 50 MB, the average size of an audio AIP for one hour of content captured at a 96 kHz sampling rate, and 24-bit depth is expected to be at least 4 GB (2 GB per hour-long BWF file each for preservation and production master, plus the much smaller mp3 files). Audio is therefore more costly to store than the digital book packages currently stored in HathiTrust. However, a finite number of unique recordings are to be digitized, and a systematic digitization of the entire collections of the Library is not planned. It is hoped that this will lead to controlled and manageable storage costs.

As there was little institutional experience or expertise in the digitization and digital preservation of audio, there was no existing workflow in place to guide the project. Additionally, the differences between book and audio formats meant that the workflow used for vended book digitization could not be easily adapted to audio materials. Determining the workflow for what would occur when digital audio files were received from vendors was difficult to establish, and

is still not finalized. While digital audio files will undergo the same or similar events as image files, it took time to come to a decision on the path the files would take and what programs they would be run through en route to being ingested into the repository.

Creating ingest and validation methods for this workflow also presented difficulties, as the current routines were built completely around images and Google-based content and could not be easily adapted for audio. While models existed, entire new processes had to be created to process and validate audio files. This involved selecting what characteristics of the files were to be validated, such as file format, as well as what metadata values were required in the AES schemas, such as sampling rate and size. The characteristics to be validated were selected based on the technical specifications for audio digitization. The technical characteristics, overall validity and well-formedness of the files could be validated by the current methods employed in HathiTrust, but the additional (automated) validation processes for the metadata needed additional programming.

Solutions developed

To overcome these challenges, the team developed a number of solutions and compromises for ingesting audio packages into the repository. Stakeholders of both the repository and the project participated in several meetings in order to come to a compromise on how audio would be stored in the repository.

The AIP structure for audio was based on best practices for audio found in Sound Directions. The AIP includes the preservation and production masters and a METS file that includes descriptive, technical, provenance, and structural metadata. Originally, three sets of audio files (preservation, production, access) were to be included in each preservation package, but instead a CD copy was used for access. Access masters will not be stored in the repository, as they could be easily derived from the production master if a new CD was needed, or when streaming delivery capabilities became available. Thus, only preservation and production masters will be stored in the repository. A .txt file of any notes made about the transfer by the vendor is included, which can be helpful in giving specific information about problems encountered during the playback and capture of the audio, such as areas where the sound drops out or is garbled. It is considered good digital preservation practice to use lossless compression for compressing and storing digital audio. However there is still some concern about this due to the large size of the files, and employing a lossy compression method is currently in discussion.

A METS document was developed that would fit the needs of audio content while simultaneously meeting repository specifications. While technical and process history (or provenance) metadata could be documented using the AES schemas, there were other types of metadata to include in the METS document in each AIP. At the time the project began, descriptive metadata was not included in the HathiTrust METS. Digitized books commonly had catalog records associated with them, and instead of including a descriptive XML schema such as MARCXML, the METS document included a link to the catalog record. However, this descriptive metadata does not exist for audio collections, as the majority are part of archival collections and extensive descriptive metadata has not been collected. Finding aids in Encoded Archival Description (EAD) do exist for many of the collections, but there is no simple way to link the METS document to the specific sound recording within the finding aid. Additionally, any bibliographic records in the Library's catalog are for the entire collection and linking to them would not be especially useful. Including descriptive metadata in METS was therefore a necessity. A local database was already in the process of being created for project and item tracking, so it was employed to record basic descriptive information. This is then exported and transformed to create Dublin Core metadata in XML for the METS document.

PREMIS preservation metadata also needed to be included in the HathiTrust METS document for audio, as was the practice with book materials. It was decided that audio would use the same preservation events in use for textual materials. These include capture, fixity check, mes-

sage digest calculation, validation and ingest. Additionally, the team considered including preservation events for more specific events, such as post-processing and qualitative quality control. However, post-processing and qualitative quality control are not performed on every audio file in a SIP, but only a percentage. This posed a problem, as the current PREMIS implementation included an event for the entire package, not for each individual file, which made it difficult to indicate what event applied to which file. The team decided to not break from this convention. Instead, a FileList extension schema, which had been developed for use in the HathiTrust book packages, was employed in the PREMIS metadata to indicate which files in the AIP had undergone a particular event. If no FileList is present in an event, the event applies to each file in the AIP. Using this FileList extension allows us to assign an event, such as qualitative quality control, to only the file or files to which the event applies, rather than to all the files in the package. An example PREMIS event using the FileList extension is below:

```
<PREMIS:event>
  <PREMIS:eventIdentifier>
     <PREMIS:eventIdentifierType>UM</PREMIS:eventIdentifierType>
     <PREMIS:eventIdentifierValue>manual quality control1
     </PREMIS:eventIdentifierValue>
  </PREMIS:eventIdentifier>
  <PREMIS:eventType>manual quality control</PREMIS:eventType>
  <PREMIS:eventDateTime>2010-03-13T18:11:00</PREMIS:eventDateTime>
  <PREMIS:eventOutcomeInformation>
     <PREMIS:eventOutcomeDetail>
        <PREMIS:eventOutcomeDetailNote>files manually reviewed
        during quality control process
        </PREMIS:eventOutcomeDetailNote>
        <PREMIS:eventOutcomeDetailExtension>
           <HT:fileList status=”reviewed”>
              <HT:file>am000001.wav</HT:file>
              <HT:file>am000002.wav</HT:file>
              <HT:file>pm000001.wav</HT:file>
              <HT:file>pm000002.wav</HT:file>
           </HT:fileList>
        </PREMIS:eventOutcomeDetailExtension>\
     </PREMIS:eventOutcomeDetail>
  </PREMIS:eventOutcomeInformation>
  <PREMIS:linkingAgentIdentifier>
     <PREMIS:linkingAgentIdentifierType>AgentID</PREMIS:linkingAgent
     IdentifierType>
     <PREMIS:linkingAgentIdentifierValue>UM</PREMIS:linkingAgentIdent
     ifierValue>
     <PREMIS:linkingAgentRole>executor</PREMIS:linkingAgentRole>
  </PREMIS:linkingAgentIdentifier>
  <PREMIS:linkingAgentIdentifier>
     <PREMIS:linkingAgentIdentifierType>tool</PREMIS:linkingAgentIden
     tifierType>
     <PREMIS:linkingAgentIdentifierValue>WaveLab 6</PREMIS:linking
     AgentIdentifierValue>
     <PREMIS:linkingAgentRole>software</PREMIS:linkingAgentRole>
  </PREMIS:linkingAgentIdentifier>
</PREMIS:event>
```


After the final decisions regarding the various metadata were made, a METS creation practice document was created to outline how to include and locate the metadata in the METS. For example, the descriptive and technical metadata are stored in the same directory as the audio files. The preservation metadata comes from multiple sources. Metadata about the capture event is pulled from particular fields in the vendor-supplied technical metadata and/or the file header. Metadata documenting the fixity check and message digest calculation events originate in the programs that run those events. Qualitative quality control is documented in a tab-delimited spreadsheet that is stored in the directory, while validation and ingest event metadata is generated during the ingest process.

Based on this METS creation practice document, a process was developed to pull together the metadata supplied by the vendor, the descriptive information from the Library database, and the preservation metadata to create a HathiTrust METS document for audio. As the creation of the HathiTrust METS for book packages is automated, the audio METS needed to be as well in order to fit into the workflow. All metadata is stored in the same directory as the completed vended digital audio files and technical metadata. The metadata is used to populate a boilerplate HathiTrust METS document during the ingest process. Likewise, the creation of the PREMIS metadata is automated and uses the metadata found in the audio file header or the vendor-supplied METS document.

The validation of the audio packages was modelled after what was currently in place for text, in order to take advantage of the expertise and existing technical infrastructure. HathiTrust was already using the JSTOR Harvard Object Validation Environment (JHOVE) output to validate file characteristics, including information from the file header. During the audio validation process, JHOVE data is output in XML. This data is used to validate file characteristics and ensure that the file is well-formed and valid. As a part of this process, JHOVE outputs metadata from the bext header of the BWF file, as well as AES metadata about the digital audio file in XML, which validates the metadata in the METS file against the metadata stored in each audio file. This also allows for the opportunity to ensure that the package matches our technical specifications. While a new validation process did have to be developed, applying the same philosophies and approaches from text to audio materials provided a measure of continuity between the two formats. The validation specifications can be found in Appendix A.

Lessons learned

Building strict repository validation and ingest routines is important, but can make ingesting new content types difficult. Trying to fit new content and data formats into the same models that already exist can present several challenges. It is important to find a balance between the needs of the repository and the needs of the particular collection, content, and format. Current practice for one format may not necessarily be sound preservation practice for another. Trying to fit all types of content into a single, strict method or routine may prove detrimental for other formats or content types.

If community standards for a particular media type are not fully developed, making decisions on how to correctly preserve the content can be difficult. As HathiTrust is designed to be a long-term preservation repository, its policies and procedures related to digital images have been informed by standards that have been refined over many years, along with the experiences of a large number of earlier projects. As standards for digital audio are not as accepted and there are fewer projects to use as examples, it is more difficult to make a strong argument for or against particular preservation strategies and policies.

It is important to make access a vital part of the planning process when developing a digitization project. As the HathiTrust repository was primarily developed to support text and images, there was no expertise in delivering streaming audio content via the repository web interface. As CDs satisfied the access portion of this pilot project, developing an access system was put on hold. As there was not a clear idea of what streaming audio access in the repository would look like, it was often difficult to come to a decision on what needed to be collected or kept,

because the contents of the Dissemination Information Package (DIP) were unknown. Initially, access to the audio in the repository may be a simple descriptive metadata record displayed to the user (similar to what exists for text and images) accompanied by a message that the item can be listened to at the originating library, along with a link to the finding aid so the user can view more of the collection to which the item belongs.

Large-scale digital audio preservation requires different resources than large-scale digital image preservation. These resources include researching and developing new digitization specifications and metadata standards; developing a RFP to send to outside vendors; purchasing new hardware for internal digitization or quality control; hiring new staff or training existing staff; allocating larger amounts of hard drive space; and developing new methods for ingest, validation, storage, and access. As the capture of audio is done in real-time, as is any manual, qualitative quality control that is performed on the digital audio, significant amounts of staff working hours must also be incorporated into the budget.

We don't even know if any of this works yet! Implementing new policies and technical procedures is not a straightforward task, and therefore takes some time. Even with a large amount of research, discussion, and development talent, issues that compromise the preservation viability of the digital audio packages may arise in the near or long-term. Pilot projects can be risky, even with the best intentions and the strongest talent behind them.

Conclusion

The pilot audio digitization project posed several challenges that could not always be solved by developing specifications based on conventions for textual materials. However, it was helpful to look to repository convention for guidance and modeling when making decisions about preservation package structure, metadata, validation, and ingest. Ideally, the work done for this pilot will provide a model for the ingest of digital audio content from other HathiTrust partners into the repository, and provide a framework for introducing other time-based media formats into the repository.

Appendix A: Validation specifications

Metadata Type	Element/ Attribute	Required or Recommended Value	Validation Recommendations
<bext>	description	Item number from collection	validate that exists and contains data
	originator	University of Michigan Library	validate that value is "University of Michigan Library"
	originatorReference	filename (barcode/track.wav)	validate that this is in correct format ; validate that a file with this name exists in directory, and that a primaryIdentifier with this value exists in METS document supplied by the vendor.)
	originationDate	yyyy-mm-dd	validate that exists and contains data
	codingHistory	none required	validate that exists and contains data
AESX098B	analogDigitalFlag	ANALOG, PHY_DIGITAL, FILE_DIGITAL,	validate that the analogDigitalFlag value in a file's JHOVE output matches the value in that file's <techMD> section. In <sourceMD>, analogDigitalFlag must be ANALOG UNLESS <aes:format>=DAT or CD, then analogDigitalFlag="PHYS_DIGITAL"
	format		The <aes:format> in each <techMD> section must match the <aes:format> from the JHOVE output for each file. There is no required value in <sourceMD> sections, but must exist and contain data.
	audioDataEncoding	"PCM audio in integer format" or "PCM"	validate that this field exists in <techMD> sections where analogDigitalFlag="FILE_DIGITAL" and matches JHOVE output for that file.
	useType	<useType> restrictions: ORIGINAL_MASTER, PRESERVATION_MASTER, PRODUCTION_MASTER	Within any <techMD> section, if <aes:primaryIdentifier> has "am" prefix, then <useType> must be PRESERVATION_MASTER. If <primaryIdentifier> has"pm" prefix, then <useType> must be PRODUCTION_MASTER. Within any <sourceMD> section, <useType> must be ORIGINAL_MASTER
	primaryIdentifier	filename in barcode/track.wav format: 39015087083500/am000001.wav	Validate that all <aes:primaryIdentifier> values in <techMD> sections exist as filenames in the directory, and that all .wav filenames in the directory exists as <aes:primaryIdentifier> values.
	checksumValue	must exist and contain data	validate against submitted file
	checksumKind	md5	validate that value is md5
	numChannels	no required value	validate that <aes:numChannels> value from the JHOVE output for a given file matches the <aes:numChannels> value in that file's <techMD>.

Metadata Type	Element/ Attribute	Required or Recommended Value	Validation Recommendations
	sampleRate	96000, unless original format is DAT or CD, then sampleRate should match that of original object	If <sourceMD>/<aes:format> is "CD" or "DAT", then <techMD>/<aes:sampleRate> must have the same value as <sourceMD>/ <aes:sampleRate>. Otherwise, <techMD>/ <aes:sampleRate> must be 96000. Also, match to each file's JHOVE output to ensure that file does in fact have the properties indicated in the METS
	bitDepth	24, unless original format is DAT or CD, then bidDepth should match that of original object	If <sourceMD>/<aes:format> is "CD" or "DAT", then <techMD>/<aes:bitdepth> must have the same value as <sourceMD>/<aes:bitdepth>. Otherwise, <techMD>/<aes:bitDepth> must be 24. Also, match to each file's JHOVE output to ensure that file does in fact have the properties indicated in the METS

THE UK SOUNDMAP: AN AUDIO CROWDSOURCING EXPERIMENT

Richard Ranft, Head of Sound & Vision, The British Library
Paper presented at the IASA-AMIA 2010 Conference, Philadelphia, USA

Why a sound map?

Certain kinds of sound collections are amenable to presentation online using a map interface. Plotting the geographical position of recordings on a map gives a visually attractive and intuitive way to compare and group neighbouring recordings and may be a better alternative to text-based search and browsing. For example, many of the 3.5 million recordings in the British Library's sound collections contain geospatial data: locations where recordings were actually created, music or dialect origins, or place-names referenced to in the metadata. In 2001 the British Library launched *Listen to Nature*,[19] a website showcasing 400 nature sounds from around the world from its existing wildlife sound collections. The site uses static web maps built by BL staff and is occasionally added to. In 2007 the Library created the *Sounds Familiar* British dialects map,[20] similarly designed and built in-house. Listeners may submit new dialect recordings of their own by mailing them on CD to the British Library. The recordings are then digitized and eventually added to the *Sounds Familiar* web map. Our *Archival Sound Recordings* website, launched in 2007, makes extensive use of interactive maps[21] to show the locations of music, environment, oral history and dialect recordings that can be played directly from the map interface. Additional recordings are added from time to time to the maps. However, none of the aforementioned websites allow direct, real-time upload and interaction by contributing recordists. That has become a more recent phenomenon of a participatory culture, shown by the flourishing number of web maps that are updated by the general public, many of them using the Google Maps API.[22] Examples include *Radio Aporee*,[23] launched in 2006, which allows anyone to upload geotagged environmental sounds worldwide under a Creative Commons License; and there are now numerous other websites of sound maps of Montreal, Berlin, Seoul, Barcelona and other cities.

An acoustic survey of Britain using geotagged sound samples

In 2009 British Library sound archive staff began tests for a new kind of field recording project to aggregate user-generated digital audio content using mobile phones. Named the UK SoundMap, the project represents a radical departure from the more traditional, curator-led professional archival practices we were used to. Hitherto, these involved a drawn-out sequence, beginning with acquisition, then professional accessioning, cataloguing, preservation and eventually, if funding and copyright terms allow, online access. The UK SoundMap instead uses an informal community of guided but untrained mobile phone users and field recordists to capture and describe their environmental sounds, then enable near-instant public sharing on a dedicated website: in effect, contributors as curator-publishers.

The initiative arose when one of our curators, Isobel Clouter, secured seed funding via the Noise Futures Network,[24] an interdisciplinary network of UK academics, urban planners, sound artists and noise pollution experts interested in Britain's acoustic landscape who need large audio datasets for research. The project aim is to create an acoustic snapshot of the UK in 2010-11, using low-cost technologies to archive a significant body of audio data, around 3,000 recordings, of sufficient quality so that it can be analysed by the Noise Futures Network and other researchers. Sounds that are likely to disappear from our environments, including everyday noises that are often overlooked in archival acquisition programmes, are being

19 www.bl.uk/listentonature
20 www.bl.uk/soundsfamiliar
21 http://sounds.bl.uk/Maps.aspx
22 See for example http://googlemapsmania.blogspot.com/
23 http://aporee.org/maps/
24 http://www.noisefutures.org/

captured and preserved. Sounds across the UK can be contrasted easily, and the project will concurrently capture the public's impression of what sounds are significant to them today. A parallel aim is to engage the general public with the project.

Use of mobile phone technology

The notion of using a pocket mobile device designed for voice communication to capture environmental sounds for a serious archival project would have seemed ridiculous just five years ago. Yet the ubiquity of phones means that nearly everyone now also carries an audio recorder. In the UK, the number of mobile phones exceeds the population figure, since many people own more than one handset. Global sales in 2010 of all kinds of mobile phones reached 0.4 billion. Furthermore, the audio quality achievable on mobile phones, while nowhere as good as a dedicated professional recorder, has nonetheless reached a point where they can be occasionally considered as suitable acquisition tool for a limited number of "mass observation" research projects. In effect, there are far more recording devices in existence today than ever before, and their owners carry them about everywhere. This opens up opportunities to collect very large numbers of audio samples. The challenge is to harness those opportunities to yield useful research data.

The solution for our project arrived in March 2009 with the launch of Audioboo,[25] a free mobile application that runs on Apple iPhone and on Android smart phones. Audioboo provides a simple interface for instant recording, tagging and uploading of sound clips to a web map using the built-in mobile microphone. To date 250,000 sound clips have been uploaded by 80,000 contributors worldwide, with the top contributors from UK, USA, Germany, and these can be listened to by anyone. There have been a total of 11 million listens to date (November 2010), an average 66,000 visits daily. Audioboo has been referred to as "Twitter without typing", "User generated BBC Radio 4" or "The YouTube of the spoken word" on account of its ease of use and social networking features. The phone's geolocation and the recording date and time are automatically registered. Users can optionally capture and add a photo and key in a description.

Immediately after recording, the audio, image and metadata are uploaded automatically and wirelessly to Amazon cloud servers. In the case of iPhone recordings, each audio clip is originally recorded as a losslessly compressed mono FLAC file at 16 bits, 22 kHz that is rendered into an MP3 for immediate web presentation. The maximum recording duration is 5 minutes, and the typical upload time is around the same as the recording duration (depending on connection speeds). So the interval between starting a 5-minute recording and publishing on the web can be as little as 10 minutes.

A web browser version of Audioboo provides an alternative to the Smartphone option. It supports recording via a microphone connected to a computer then upload to Audioboo's servers, as well as uploading of an existing audio file in a choice of lossy and lossless formats (WAV, FLAC, AIF, OGG, MP3, and AAC). As the browser upload method also accepts stereo files, it is often the choice for the more discerning field recordists to contribute higher quality recordings made with professional microphones and recorders, but of course it lacks the immediacy and simplicity of the mobile option.

25 http://audioboo.fm/

The power of crowdsourcing and its challenges

Crowdsourcing ("a distributed problem-solving and production model"[26]) has been used for a wide variety of activities in support of heritage collections and scientific research,[27] including:

- metadata enrichment , e.g. basic labelling of photo and video collections;
- editing objects for web access, e.g. image cropping;
- improving or validating automatically extracted metadata, e.g. from digitised print and manuscript images;
- searching for extra-terrestrial intelligence.
-

There are many other examples[28] not without their disadvantages. In the case of the UK SoundMap, there are technical, legal and ethical risks arising from the 'publish first, archive later' crowdsourcing model. These include:

- poor sound quality, particularly wind noise and low quality recording equipment;
- deliberate or inadvertent contributions of inappropriate recordings (e.g. copyrighted music or spoken performances, invasions of privacy, derogatory or rude language);
- inconsistent and metadata quality and/or missing metadata;
- irrelevant recordings (e.g. outside the geographical scope or subject matter).

Little can be done with some of the technical limitations of using standard consumer mobile phones. Our own lab tests on an Apple iPhone microphone showed it has a pronounced treble emphasis at about 4 kHz, and the A-D converter has a very poor or even absent brick wall filter, resulting in severe aliasing for all signals above 10 kHz. An Android-based Smartphone, by comparison, had better anti-aliasing, but a high noise floor and poor low frequency sensitivity. These limitations do not reduce the overall value of the data for most comparative studies, but may make many of the recordings unsuitable for detailed acoustic analysis.

Other risks are mitigated by the following:

- all participants are bound by Audioboo terms and conditions;
- clear instructions are provided to all contributors;
- pre-publication moderation: all recordings tagged for the UK SoundMap are moderated by listening through and checking the metadata;
- post-publication notice and take-down procedures — probably not needed because all contributions are carefully moderated in advance of publication;
- giving advice on recording techniques, in particular reducing wind noise which can be obtrusive on outdoor recordings.

On balance, the solution chosen — crowdsourcing mobile phone contributions and a unique three-way mash up between Google Maps, Audioboo and the British Library's website — was a practical and cost-effective compromise to gather a large body of data in a relatively short space of time.

26 http://en.wikipedia.org/wiki/Crowdsourcing
27 Examples: (a) the SETI@home project uses the enormous processing power of many distributed personal computers to analyse radio telescope data. The programme runs when the screensaver is triggered (http://science.nasa.gov/science-news/science-at-nasa/1999/ast23may99_1/); (b) the Waisda? video labelling game is used to label TV programmes held at the Dutch Institute for Sound & Vision ("*Using a Video Labelling Game in Audiovisual Archives*", paper presented at IASA 2010 by J. Oomen, L. B. Baltussen & S. Limonard); (c) reCAPTCHA uses OCR images of the *New York Times* to prevent spambot submissions to websites. Human readers must interpret the images and consistent results are pooled; (d) *Transcribe Betham*, (www.ucl.ac.uk/transcribe-bentham/) invites anyone to transcribe the unpublished manuscripts of British philosopher Jeremy Bentham (1748-1832).
28 See for example: Long, P (2010). *How can crowdsourcing help museums and what are the implications for future practice?* London University, Unpublished dissertation.

Results

Following extensive testing, the SoundMap was publicly trialled in July 2010 in and around Sheffield city, in South Yorkshire in England, as the start of a 12 month project, extending to UK-wide coverage the following month. Recordings were published on the British Library's SoundMap within 48 hours of the contributors tagging their Audioboo recording with a 'uksm' tag. As the number of map points increased above a 100, the performance of the standard Google Maps mash-up started to decrease, so the Audioboo data feed is now configured via Google Fusion Tables API — this method potentially allows the display of 10,000s of map points at no slowdown of web pages. The original FLAC files are obtained from Audioboo under license and added to the British Library's digital library system along with images and metadata, for permanent reference.

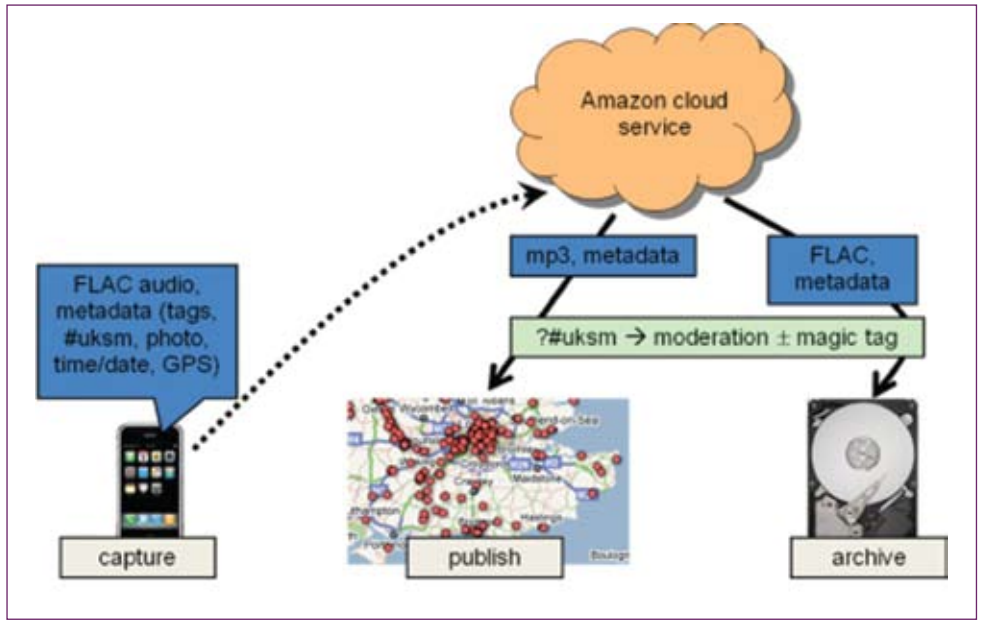


Figure 1. Schematic diagram of the recording-publishing-archiving processes

Between July-October 2010, 1,000 recordings were contributed from 260 recordists, comprising sounds of voices and direct human actions, amplified sounds and music, machinery (especially trains, buses), sounds of wind and water, and animals. 82% were made with mobiles, the remainder used dedicated recorders.

Public and media interest at the launch helped boost interest, and this was sustained through social networking sites. The feedback from online communities, the sector who inevitably were the most engaged with this project, was not always positive. *"Whose brainchild was this? Will anyone really be interested in sounds originating from 2010? Don't we have anything better to do with taxpayers money?"* wrote one blogger. But most were full of praise: *"The increasingly innovative British Library" (*BBC Technology blog), and a typical tweet was: "*Can't describe the pure pleasure and pride in contributing to @UK_SoundMap*".

As expected, the number of contributions declined after the summer, and is expected to pick up after the winter months and following the second planned publicity drive in spring 2011.

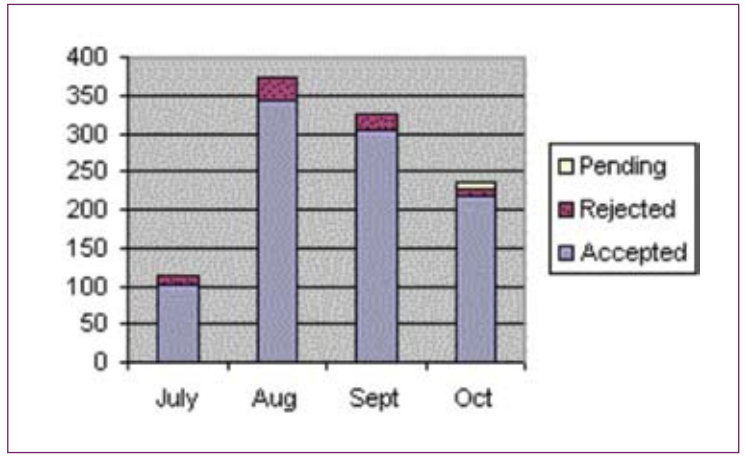


Figure 2. Number of accepted, rejected and 'pending' recordings, July-October

70 recordings (6% of total) have been rejected to date, due to:

Copyright violations (music/broadcast/performance)	36%
Poor quality (wind noise, low level)	22%
No geodata	19%
Obscenities, time wasters, advertising etc	19%
Recorded outside UK	3%

Conclusions

The project quickly proved its value in generating positive publicity for the British Library, creating a usable collection of environmental sounds, and demonstrating the potential of new technologies and the relatively simple methods used to bring them together. The success of the project has spawned a similar crowdsourcing project at the British Library. This new project seeks to map spoken English accents on a global scale. It is times to coincide with a temporary exhibition Evolving Englishes,[29] being held at the British Library. The English accents map requires users to recite a prescribed text so that contributions are more controlled and directly comparable.

Future challenges include extending similar community archiving projects to other kinds of sounds while ensuring that what is collected is of sufficient quality to have lasting research value. Today we cannot hear the sounds of say, Dickensian London streets, without travelling back in time. Yet in a century from now, we *shall* be able to listen to everyday sounds of today gathered in the early 21st century, thanks to the many contributors to the UK SoundMap and similar initiatives.

Acknowledgements

Thanks to Audioboo, The Noise Futures Network, Charlie Mydlarz (Salford University) and my colleagues Adrian Arthur, Chris Clark, Isobel Clouter, Andrew Pearson, David Penty, Ian Rawes and Chloe Titcombe.

[all web addresses correct as at 7 January 2011]

29 http://www.bl.uk/evolvingenglish/

Alan Boulanger — John Cowley — Marc Monneray. La Musique antillaise en France. Discographie 1929 — 1959. French-Caribbean Music in France. A discography 1929 — 1959. AFAS — LAMÈCA, Guadeloupe 2008

Pekka Gronow, University of Helsinki

Recordings have had a great importance on the diffusion of the new musical idioms, which spread from America to Europe (and the rest of the world) in the 20th century. The most prominent example is certainly jazz. The history of recorded jazz has been documented in minute detail in discographies since the 1930s. The amount of attention paid to jazz recordings has left in shadow many other forms of vernacular music which had a similar evolution. To give an example, Argentinean tango, Cuban rumba and Hawaiian popular music also came to Europe in the early 20th century through recordings and visiting musicians. In their wake followed local European bands which attempted to emulate the style and in turn made new recordings. But the discographical documentation of these idioms lags far behind jazz.

Alan Boulanger, John Cowley and Marc Monneray have now compiled a discography of a relatively unknown idiom whose history parallels that of jazz, but which was mainly limited to the Francophone world. Hearing for the first time the recordings made by French-Caribbean bands in the 1920s and 1930s gives a strange feeling. The instrumentation and sound resemble old New Orleans jazz, but rhythmically the compositions are waltzes or beguines. Was French Caribbean music influenced by jazz? Was jazz influenced by French-Caribbean music? Were they independent, parallel developments? We do not really know.

The first Creole musicians from Martinique seem to have appeared in Europe in 1902 after the eruption of the volcano which destroyed the entire city of St. Pierre, but the exodus of musicians really began in the 1920s, when the Antillean community in Paris was expanding. At first they seem to have played at dances and cafes for their compatriots, but gradually the music also attracted the attention of night-clubbers and the emerging community of jazz fans. The regular recording of Antillean music began in 1929, when clarinetist Alexandre Stellio and L'Orchestre Antillais made their first recordings for Odeon. In 1931, the band also performed at the Guadeloupian pavilion and the Paris Colonial Exposition, which gave the music wider exposure.

In the following years, Antillean musicians also became involved in the wider jazz and dance music scene in Paris. For instance, Guadeloupian saxophonist, Robert Mavounzy, played with Django Reinhardt, and trumpeter, Abel Beauregard, from the same island, played in Rico's Creole Band, a rumba band led by Filiberto Rico from Cuba. Such recordings are also documented here.

Paris was the main recording center for Antillean music. The discography ends in 1959, thus covering the entire 78 rpm era and the first microgroove releases. The authors note that on the basis of information available, it was not always possible to separate shellac and microgroove releases from each other, as the same recordings could be released in both formats. Local labels emerged in Guadeloupe and Martinique in the 1950s, and in the following decades, Antillean companies such as Disques Debs became a major force in the development of Franco-Caribbean music. Hopefully, their activities will also be documented later on.

La Musique antillaise en France comes with an historical introduction in English and French, biographical notes on the principal artists, a list of Paris clubs active in presenting Antillean music, a bibliography and artist and title indexes. It is presented with the care and amount of detail which we have come to expect from these authors. The book is invaluable to all collectors and researchers of Antillean music, but it can be recommended to anyone with a broader interest in the history of jazz or 20th century popular music in general.

My only complaint is that the book is not for sale. I am informed by the publisher that it is available — free of charge — to members of AFAS, Association française des détenteurs de documents sonores et audiovisuels. Interested persons can find AFAS at http://afas.imageson.org/ . The book is well worth the membership fee.

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Editor: **Janet Topp Fargion**, The British Library, 96 Euston Road, London NW1 2DB, United Kingdom. Fax +44 (0)20 7412 7441 - email janet.toppfargion@bl.uk

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Editor: **Janet Topp Fargion**, The British Library, 96 Euston Road, London NW1 2DB, United Kingdom. Fax +44 (0)20 7412 7441 – email janet.toppfargion@bl.uk

Web editor **Richard Ranft**. The British Library, 96 Euston Road, London NW1 2DB, United Kingdom. Fax +44 (0)20 7412 7441 – email richard.ranft@bl.uk

Secretary General: **Ilse Assmann**, The South African Broadcasting Corporation (SABC) Media Libraries, P O Box 931, 2006 Auckland Park, South Africa. Fax : +27 (0)11 714 4419. email: assmanni@sabc.co.za

Treasurer: **Anke Leenings**, c/o Deutsches Rundfunkarchiv, Bertramstraße 8, D - 60320 Frankfurt am Main, Fax: +49 69 15687 25-150. email: anke.leenings@dra.de

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Layout by Smallgoodthing, London, UK. Printed by Bellsway Print, Orpington, UK.

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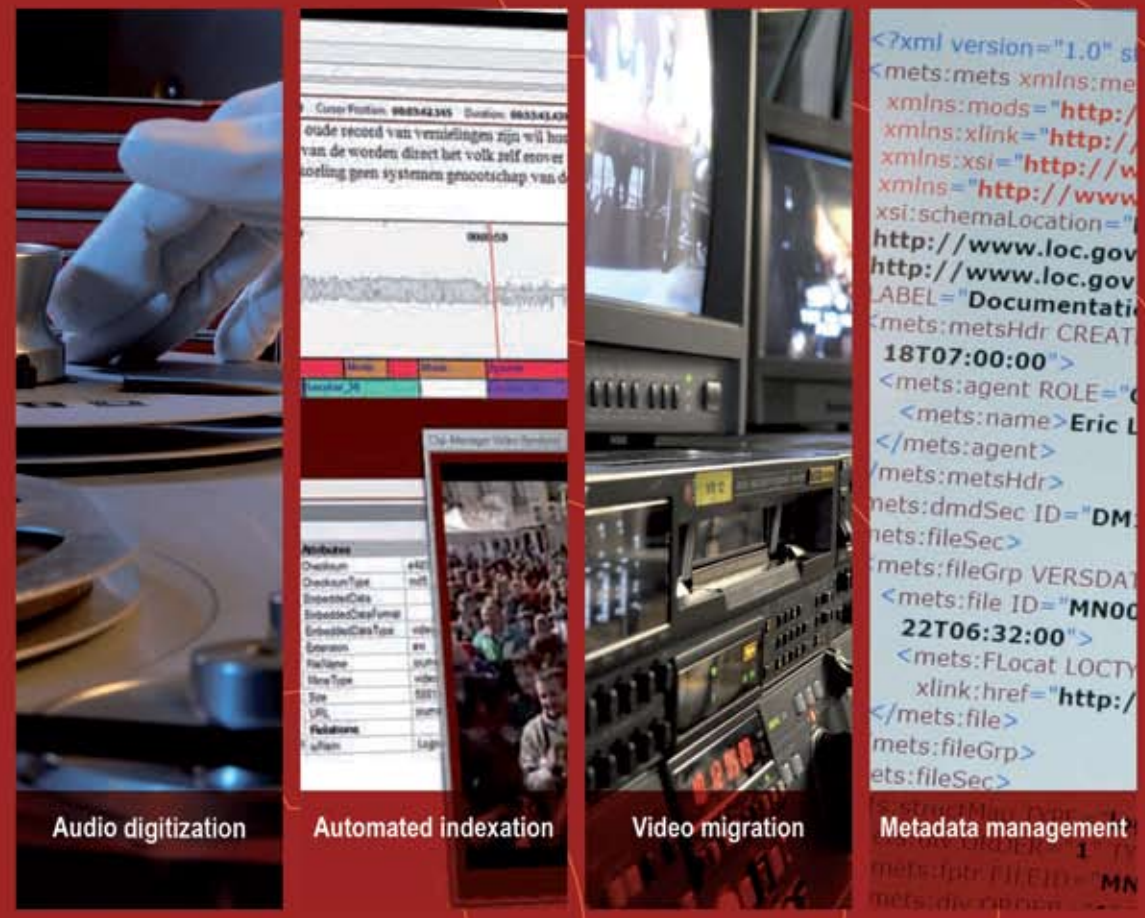

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