

Digitisation of Research Sound Collections: Practical Application of IASA Guidelines in Small-Scale Digitisation Projects

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Introduction

Over the past 50 years research institutions in Eastern European countries have accumulated significant collections of linguistic, ethnomusicological and folkloristic audio material. These holdings represent unique sound and audiovisual documents of remarkable cultural value and will only survive if transferred into the digital domain in the mid-term. The Vienna Phonogrammarchiv has been involved in several such digitisation projects of research holdings, which have partly been funded from outside.

One of the starting points for the Phonogrammarchiv's engagement was the political change around 1990 in former Eastern Bloc states. Since the 1950s, research traditions in these countries had produced, as compared to research institutions in the West, an unusual amount of mainly audio documents in the fields of linguistics, ethnomusicology and cultural anthropology at large. The political changes were accompanied by severe changes in the administration and funding of heritage and research institutions, which partly put these collections at serious risk. In order to explore the situation, audiovisual archives have been systematically contacted and visited between 1992 and 1995.¹²⁹ An actual overview of the situation of audiovisual research collections and their preservation status can be found in the report published in the framework of TAPE (Training for Audiovisual Preservation in Europe) (Schüller, 2008). These contacts initiated a number of smaller and more substantial contacts, of which several ultimately lead to digitisation projects.

The collections supported by the Phonogrammarchiv concerning strategic planning and practical implementation of digitisation include the Institutul de Etnografie si Folklor "Constantin Brăiloiu" of the Rumanian Academy of Sciences, Bucharest (Rumania),¹³⁰ the Institute for Cultural Anthropology and Art Studies (formerly Institute for Folk Culture) of the Albanian Academy of Sciences, Tirana (Albania)¹³¹ and the Phonogrammarchiv St. Petersburg, Pushkinsky Dom, (Russia).¹³² In 2007 the Phonogrammarchiv of the Austrian Academy of Sciences was the UNESCO Jikji Prize winner. In the application for the prize, it had been stated that the prize money (donated by Cheongju City) would be used to contribute to safeguarding an audiovisual collection, preferably from a country with a developing economy. In the same year the José Maceda Collection of the University of the Philippines was inscribed by UNESCO on the International Register of the Memory of the World Programme. Familiar with the collection and its precarious situation from previous contacts, the Phonogrammarchiv thus decided to spend the prize money on the digitisation of this important corpus of ethnomusicological recordings.¹³³

Recent supporting projects of the Phonogrammarchiv include the digitisation of the sound archive collection of the National Archives and Library of Ethiopia, to be financed by UNESCO.

Similarities and common problems

In many cases the collections have been created by researchers privately or in cooperation with an institution, and have been held and stored outside audiovisual archives proper. At some point such documents were incorporated into the archival holdings of research

¹²⁹ This survey has been funded by the Austrian Ministry of Science and Research.

¹³⁰ Financed within the EU-funded project "ethnoArc". (2006-2008)

¹³¹ Financed by the Austrian Development Agency (ADA) 2005-2009.

¹³² Financed by two INTAS Projects and most recently by the Endangered Archives Program of the British Library

¹³³ For further information see http://www.phonogrammarchiv.at/wwwnew/jose_maceda_coll_e.htm and http://portal.unesco.org/ci/en/ev.php-URL_ID=16050&URL_DO=DO_TOPIC&URL_SECTION=201.html

institutes or other related archives. To date, a bundle of problems created by this situation have been identified:

- Usually the keeping institution is not an A/V archive in a narrow sense and therefore suffers from a lack of modern professional replay facilities and A/V media knowledge. In addition, such institutions suffer staff shortage, inadequate funds and sometimes management problems (such as awareness about the vulnerability of A/V media, mistrust of cooperation with other institutions with similar problems, etc.), as well as the lack of expertise and financial means to keep the analogue originals and subsequently the digital data alive.
- Typically these collections are “mixed media” holdings. The great diversity of archival holdings is on the one hand caused by such incorporations of external collections as described above, but sometimes also by a lack, or a change, of collection policy.
- In the majority of cases the holdings have been created with consumer equipment, often with multiple previous owners. The collections have been recorded and stored under irregular and/or irreproducible conditions. This generates a wide range of associated challenges concerning transfer and digitisation planning: usually the lack of (technical, but also other, e.g. content related) documentation (including information about recording formats and parameters, like speed, trackwidth, etc.) makes it difficult to accurately estimate the quantity of the holdings and time and expenses needed for digitisation. This easily results in miscalculation of digitisation efforts and costs. Format obsolescence is an additional problem, especially if proprietary (consumer) technology has been used for recording. The preservation status of the holdings can be critical and thus the time factor for transferring the collection can vary greatly.

Summarising all these factors, the collections are of unique contents, containing mostly field recordings which are incorporated in a research environment. The heterogeneous structure and the possibly critical preservation status usually require an individual manual transfer and adequate scientific documentation, but infrastructure, expertise and financial means are lacking. The challenge is to implement a manual high quality transfer at low cost and with high reliability, incorporating infrastructure and technical skills.

Preconditions

Such projects need a number of basic decisions to be made, so a detailed knowledge of the general situation of the institution and the collections to be digitised is necessary.

Basic requirements that make an individual in-house transfer effective are:

- A minimum size of the collection

If the collection is too small, cost efficiency is not given. In this case it is recommended to seek cooperation with institutions in similar situations. In practice it is problematic to accomplish such a joint venture due to lack of strong interregional management, mistrust and internal competitiveness. As an alternative, outsourcing could be a solution. Unfortunately it is problematic to find an adequate and trustworthy service provider at moderate cost, especially if the collection is not to be shipped across the globe. From our experience a point of intersection is given at a minimum number of about 2000 hours of audio material to be digitised.

- Expected increase of the collection

If the size of the collection is very small, but steady increase is to be expected, the setup of an in-house infrastructure is reasonable. The implementation of a center of A/V competence can be a big advantage for other institutions and also a financial benefit for the institution running the facilities.

- Not too many different (multimedia) formats to cover

If the formats vary extremely (e.g. very small quantities of a lot of different and/or obsolete media), setting up an in-house infrastructure will be very expensive and therefore not very effective. In this case, outsourcing should be considered e.g. parts of the collection for digitisation, keeping in mind the associated problems, as mentioned above. In practice a mixed strategy could be considered, if necessary.

Combined with the fact that educated (scientific and/or technical) staff with knowledge of the collection should be available, and cooperation with local IT specialists is possible, these requirements make an individual small scale in-house transfer cost-effective and possible to implement successfully.

Assessment and appraisal of the collection and infrastructure

The first step in starting such a digitisation project is an assessment of the collection with the aim to gain as much information as possible about the overall preservation status, the size in terms of playing time and technical parameters required for calculation of replay equipment. It is a fact that the more information about the collection that is available, the better the calculation of needs can be carried out.

One possibility of gathering information about the situation of the individual collection is to send out a questionnaire to the owning institution to cover the important main topics such as the amount of holdings listed by type of carriers, information about storage areas, analogue and digital infrastructure, IT implementation, metadata infrastructure, and so on.

A12								
LIBRARY #	RB	MATERIAL	THICKNESS MIL	SIDE	HEAD IN (HI) / TAIL OUT (TO)	SPEED	GOOD / BAD	CONDITION
IL1 69 / SCB1	5	POLYESTER	1.5	A&B		7 ½		START OF MUSIC WAS CUT
IL2 70	3	ACETATE	1.0	(L)MONO		3 ¾		CURLED
IL3 70	3	ACETATE	1.0	(L)MONO		3 ¾		CURLED
IL4 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL5 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL6 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL7 71	5	POLYESTER	1.6	(L)MONO		3 ¾	✓	
IL8 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL9 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL10 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL11 71	5	POLYESTER	1.5	A&B		1 ½	✓	
IL12 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL13 71	5	POLYESTER	1.5	A&B		1 ¾	✓	
IL14 71	5	POLYESTER	1.5	A&B		1 ¾	✓	
IL15 71	5	POLYESTER	1.5	A&B		1 ¾	✓	
IL16 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL17 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL18 71	5	POLYESTER	1.5	A&B		A 3¼ B 1¾	✓	
IL19 71	5	POLYESTER	1.5	A&B		A 1¼ B 3¾	✓	
IL20 71	5	POLYESTER	1.5	A&B		1 ¾	✓	
IL21 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL23 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL24 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL25 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL26 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL27 71	5	POLYESTER	1.5	A&B		1 ¾	✓	
IL28 71	5	POLYESTER	1.5	MONO		A 1¼ B 3¾	✓	
IL29 71	5	POLYESTER	1.5	A&B		A 1¼ B 3¾	✓	
IL30 71	5	POLYESTER	1.5	MONO		1 ¾	✓	
IL31 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL32 71	5	POLYESTER	1.5	A&B		3 ¾	✓	

Figure 1. Result of the questionnaire, José Maceda Collection of the University of the Philippines

IASA offers a special publication to examine the issues underlying the process of setting priorities for the digital transfer of analogue and digital audio content, and to deliver a

statement of principles for use by sound archives in their planning for digitisation. This is the “Task Force to establish Selection Criteria of Analogue and Digital Audio Contents for Transfer to Data Formats for Preservation Purposes” (IASA, 2004).

A very helpful tool, especially for estimating the overall preservation status of individual collections, has been developed by the Indiana University Digital Library Program within the Project Sound Directions. The FACET (Field Audio Collection Evaluation Tool) can be downloaded from the website <http://www.dlib.indiana.edu/projects/sounddirections/facet/downloads.shtml>. Furthermore, this institution provides a very useful reader for best practices on audiovisual archiving, focusing on the individual transfer of heritage material (Casey and Gordon, 2007).¹³⁴

Other possibly helpful tools for such an assessment have been developed within the project PrestoSpace (the preservation, storage and cost calculators, see <http://prestospace-sam.ssl.co.uk/analysis/>). Although basically designed to meet large scale approaches, these tools can be used in small scale approaches, too.

To gain a more detailed impression of the general status of the collection, it is advisable to take random samples from the collection and to have a more detailed analysis of the preservation status and recording parameters.

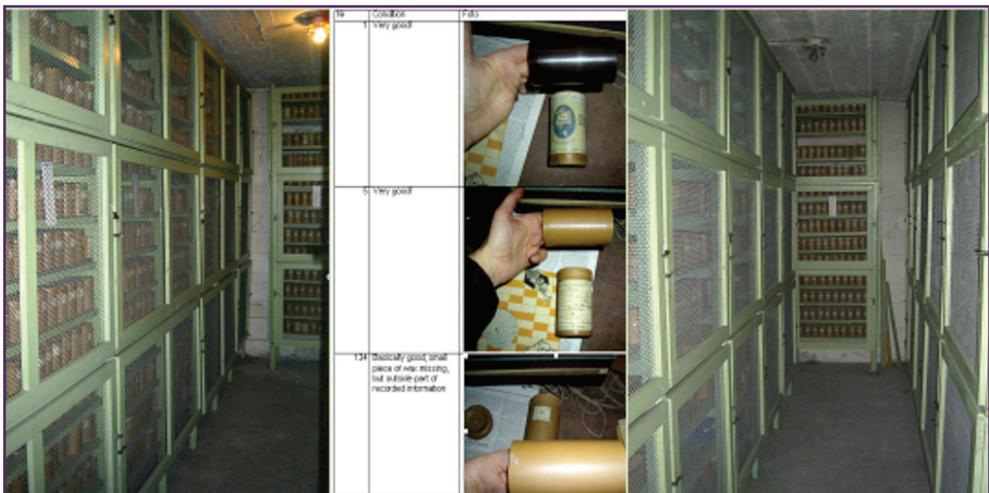


Figure 2. Assessment of the cylinder collection of the Institutul de Etnografie si Folklor “Constantin Brăiloiu” of the Rumanian Academy of Sciences, Bucharest (Rumania)

Additionally it is useful to make an assessment of the equipment that has been used for recording the original tapes. Although in many cases it is not possible to get information about all machines, it can still be helpful to find out details about track formats, speeds and other, maybe irregular, parameters to expect within a collection. This helps to avoid miscalculation concerning playing time and equipment needs. In a further step, the available equipment (including the IT infrastructure) should be evaluated for usefulness in the digitisation and documentation process.

The storage area and building constructions should also be assessed to calculate the measures needed for optimising long-term storage. Sometimes even minor equipment acquisition, like the purchase of a hygrometer and a dehumidifier, can significantly improve long-term storage conditions.

¹³⁴ see http://www.dlib.indiana.edu/projects/sounddirections/papersPresent/sd_bp_07.pdf

An assessment of the existing metadata structure is also useful and will help in calculating costs for database implementation.



Figure 3. Assessment of the metadata structure and of the original recording equipment of the collection of the Institutul de Etnografie si Folklor “Constantin Brăiloiu”, Rumanian Academy of Sciences, Bucharest (Rumania)

Developing a preservation plan

Next, a preservation plan has to be developed, proposing a prioritised sequence of actions based on different urgencies for different parts of the collection. In such a preservation plan the focus is on the most endangered medium with the highest scientific value and the most frequent access, balancing these factors carefully. The preservation plan should include calculations for optimising storage conditions, digital transfer and the definition of equipment needed. This plan should represent a profound basis for designing a business plan of investment.

A setup of infrastructure should include calculations and specifications for:

- Analogue replay equipment
- A/D Converter
- Maintenance equipment and spare parts
- Digitisation workstations
- Access stations
- Server
- Database
- Additional needs and infrastructure
- Running costs to keep digital data alive.

The preservation plan developed in our projects is based on a concept for a small scale approach to digital storage and follows the specifications and recommendations of IASA-TC 03: “*The Safeguarding of the Audio Heritage: Ethics, Principles and Preservation Strategy*”, Version 3, December 2005,¹³⁵ and IASA TC04 “*Guidelines on the Production and Preservation of Digital Audio Objects*”, Second Edition, 2009.¹³⁶

The simplest and smallest concept is a single operator input and access station, where the archival files and the access copies are created. The digital audio workstation (DAW) has a desktop RAID array attached. The contents of the RAID have to be regularly, and with at least two copies, backed up to data tapes (e.g. LTO). The data tapes are manually loaded for storage on traditional shelving, with increased attention to minimising the presence of dust and other

¹³⁵ Download from http://www.iasa-web.org/downloads/publications/TC03_English.pdf

¹³⁶ See http://www.iasa-web.org/special_publications.asp

particulates and pollutants. As disc storage has become constantly cheaper during recent years, parallel copies on (externally stored) hard discs optimises data security. This concept is a comparatively easy, reliable and applicable solution. This setup requires a well structured plan for digitisation, as well as careful management of copy location information and version information, which is done semi-manually.

Access to the material can be managed traditionally, via copies on access media (like CDR or DVDR), or via browsing copies (e.g. in MP3 format) that are accessible from the workstation via a user account. Ideally, access is separated from the ingest station, so this approach is only applicable in very small institutions, following a restrictive user policy. Online access is not included, as this requires additional functionality.

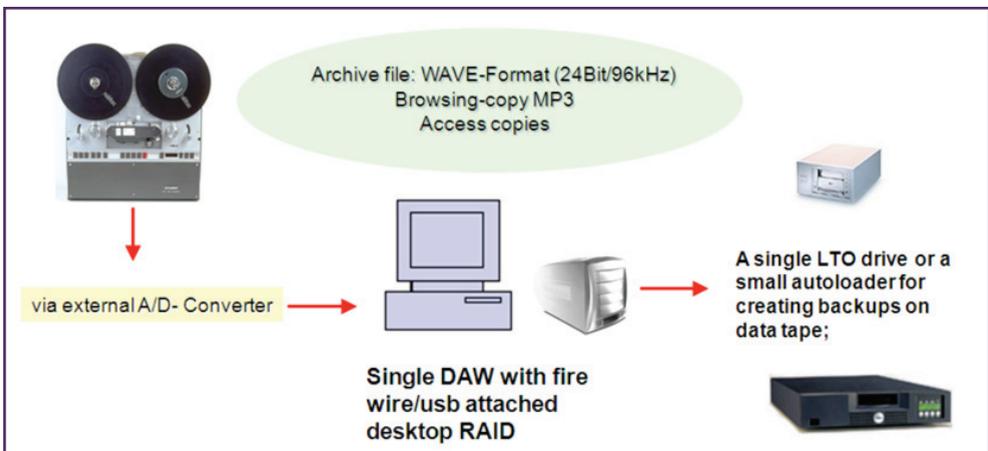


Figure 4. Simple concept for a small scale approach to audio digitisation

The system can be expanded to a small scale network for two or more ingest stations, also of different media (e.g. cassettes, DAT, etc.) and one or more users, on the basis of a Network Attached Storage (NAS) system with a capacity between ~ 0.5 to 20 terabyte (TB) of disk storage. Combined with an LTO autoloader this is already a midrange solution but certainly needs a higher level of administration to work properly.

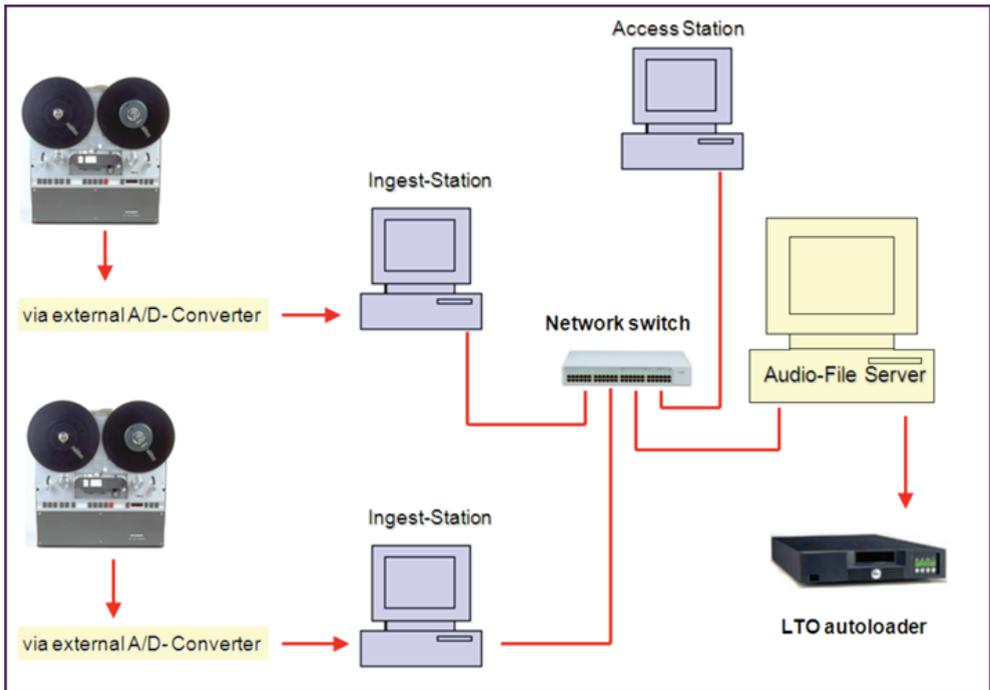


Figure 5. Small-scale network for two ingest stations and one or more users

Whenever such manually handled solutions are considered (in most cases due to lack of money), a stringent copy and safety strategy has to be implemented. This can only be reached by using unique identifiers that can be written to the data tapes header and can be useful for data verification, especially in future migration processes.

It is beneficial to direct the acquisition of all necessary equipment in a way that long-term support and service can be managed locally. Although it can be time consuming and long-winded to find a local dealer for dedicated equipment, this concept allows efficient troubleshooting and time saving in the long-term. To ensure the maintenance of such a concept, support is managed by cooperation with local IT specialists (e.g. coming from the IT departments of local Academies). It is necessary to have assurance that the system will be regularly updated, and that the upkeep of the digital data will be guaranteed. Preferably, a digital long-term storage strategy based on the Open Archival Information System (OAIS)¹³⁷ should be followed.

Metadata

As dedicated tools for capturing metadata were missing in the infrastructure of our digitisation projects, we had to find a cost efficient solution for this important point that was easy to implement. The focus was on a concept that can be easily managed and hosted locally, can be easily integrated to an existing intranet, can be opened to the Internet if necessary, and that provides very good safety mechanisms and data security strategies. In cooperation with our consultant Dr Andreas Matzke, who works for the Senior Expert Service SES in Bonn, Germany, a database, based on open source software and kept very simple and easygoing so that it can be handled by untrained staff, was developed. The system relies on widely used open source software: Linux Ubuntu, database system MySQL, Apache Server, user interface based on php5.

¹³⁷ CCSDS 650.0-B-1 Reference Model for an Open Archival Information System (OAIS). Blue Book. Issue 1. January 2002, adopted as ISO 14721:2003. See: http://nssdc.gsfc.nasa.gov/nost/isoas/ref_model.html and <http://public.ccsds.org/publications/archive/650x0b1.pdf>

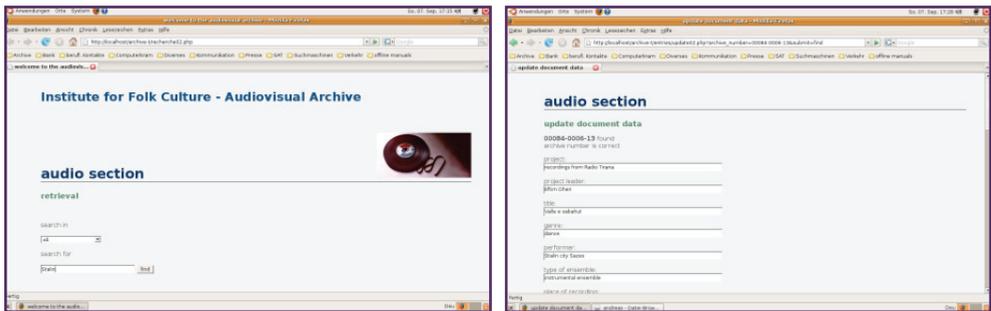


Figure 6. The database of the Institute for Cultural Anthropology and Art Studies of the Albanian Academy of Sciences in Tirana (Albania). Left: Screenshot of the search page of the database; right: Screenshot of the database input module

The database connects documents and according metadata, supports the collection of documents and metadata and offers facilities to access its content. One of the basic design concepts of the system was to make handling and maintenance as safe and easy as possible. In fact the number of screen pages used as an interface between the archivist and the system is rather small, and there are just three different types of screen pages a normal user of the archive will see. As a result, using the system can be learned in a short time. This should not keep the archivist from taking special care during the manipulation of metadata. The archive system can easily be adapted to future needs, like additional types of metadata, different and complex retrieval functions, integration of existing external documents and data or facilities to transfer its own content to other external archives. A specific feature is also its ability to handle multiple scripts. It has been already used in Arabic applications, and in the Ethiopian Project it will use Amharic script.

Training and practical implementation

Within the projects, a two week hands-on training of technically interested/educated staff (with practical archival experience) in the Vienna Phonogrammarchiv was calculated. The main focus of these training sessions was on the unmodified high quality transfer (conforming to IASA TC03/TC04), digitisation workflow, maintenance of analogue tape machines and documentation, especially of transfer metadata. Our experience shows, that this is a good time span for training, balancing costs and demands, provided that the staff to be trained have a minimum preparatory education.

The practical implementation of the projects includes the acquisition of adequate replay equipment. In practice, as new analogue magnetic tape machines meeting the IASA specifications are not available on the market anymore, used replay equipment was purchased and revised to fit the necessary specifications and parameters outlined in IASA TC04 [p.8f. and p32ff.]. The equipment was shipped and thereafter was installed locally. Digital equipment and other infrastructural devices were purchased from local providers, mainly to ensure local maintenance and support. After successful onsite installation, the local staff were trained in-house, and digitisation of some initial analogue tapes was carried out. This task was calculated to allow up to three weeks for server and database installation, and one week for the audio setup. Within this process the workflow for digitisation was optimized and adapted to the needs of the specific archives.



Figure 7. Discussing the workflow for the digitisation of halftrack consumer tapes with the team of the Institute for Cultural Anthropology and Art Studies of the Albanian Academy of Sciences in Tirana (Albania)

After successful processing of some critical tapes, the first results were presented to the department heads. Additionally, the projects were regularly presented to the public by organising press conferences and digitisation workshops. By means of such specific actions, public awareness could be raised and the importance of the collections as a promising basis for a sustainable consolidation of such repositories of important ethnomusicological sources could be emphasised.

Subsequent technical and conceptual support

The projects are currently either already completed, or are working autonomously (except the digitisation of the sound archive collection of the National Archives and Library of Ethiopia, which is still in the phase of preservation planning and equipment acquisition). Nevertheless the Phonogrammarchiv gives ongoing support and training concerning A/D transfer, technical problems on the playback side, as well as help in obtaining spare parts and additional equipment to guarantee high quality transfers with optimum signal retrieval from original tapes. Additional features of specific quality checks have been implemented so that the quality can be controlled from afar. Long-term service of storage facilities is solved by cooperation with local IT specialists, as outlined before. Additionally, a second digital copy of the important collection of the Institute for Folk Culture of the Albanian Academy of Sciences has been deposited in the Vienna Phonogrammarchiv. This acts mainly as an additional safety measure for ultimate disaster preparedness, but also as a second access point under restricted access rights.

Conclusion

The examples of practical implementation of small scale digitisation projects outlined above show that the IASA guidelines and standards relating to the long-term preservation and digitisation of sound recordings are a most useful reference in daily archival work.

Nevertheless, there were many lessons to learn in their practical application. Creativity, helping yourself in situations where infrastructure is lacking, a soldering iron and the famous gaffer tape, as well as good mood and the enthusiasm to have the job done, are essential ingredients and make life easier. Balancing between different mentalities is important, and sometimes the ambition to meet the ultimate quality requirements has to be pragmatically modified and efficiently realised. Outstanding personal engagement and enthusiasm of the staff is the basis for successful implementation.

The digitisation projects discussed in this paper have also been designed as regional pilot projects that should be seen in a larger context. They present a strong relation to identity, democracy and human rights, as they directly and indirectly strengthen the self-respect of cultures that predominantly rely on orally transmitted cultures, promote linguistic and cultural diversity, and ensure sustained access to that kind of documentary heritage. Additionally, they secure jobs and increase the competence of the institutions.

Under the prevailing financial conditions of the countries, sustainable audiovisual preservation can only be achieved by cooperation. The projects outlined could meet the high expectations to serve as examples for the cooperative solution of similar problems. Cooperation to manage and further develop all audiovisual holdings of the region is ongoing, and the competence acquired in the training and practical implementation of the projects can be maintained and further developed for the benefit of all existing audiovisual holdings of the region. This creation of competence centers also diminishes the risk of declining preservation budgets, and hopefully such projects will be supported even beyond present financial limits.

Further cooperation and, not least, a cordial friendship connects our institutions and shows that no archive should stay an island in the ocean of digitisation!

I would like to thank Dietrich Schüller and Andreas Matzke for their contributions to this article.

References

Schüller, Dietrich, 2008. Audiovisual research collections and their preservation. European Commission on Preservation and Access. Report published in the framework of TAPE (Training for Audiovisual Preservation in Europe) http://www.knaw.nl/ecpa/TAPE/docs/audiovisual_research_collections.pdf

International Association of Sound and Audiovisual Archives. "2004. "Task Force to establish Selection Criteria of Analogue and Digital Audio Contents for Transfer to Data Formats for Preservation Purposes". <http://www.iasa-web.org/downloads/publications/taskforce.pdf>

Casey, Mike and Bruce Gordon (eds) 2007: "Sound Directions. Best Practices for Audio Preservation." Indiana University. http://www.dlib.indiana.edu/projects/sounddirections/papersPresent/sd_bp_07.pdf

CCSDS 650.0-B-1 Reference Model for an Open Archival Information System (OAIS). Blue Book. Issue 1. January 2002, adopted as ISO 14721:2003.