

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

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

Presto4U³⁶ is a two-year European project (started in January 2013) that addresses the issues related to long-term digital preservation in the audiovisual domain and aims to identify useful research results for audiovisual digital preservation through awareness and adoption by technology and service providers as well as media owners.

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

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

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

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

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

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

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

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

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

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

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

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

2. The world of sound archives

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

The survey we carried out shows that the audio material present in these archives consists predominantly of open reel tape (almost exclusively under the form of 1/4 inch tape), micro-groove discs (so called “vinyl” or LP), replicated coarse groove gramophone discs (commonly called “shellacs”), instantaneous discs (also known as “direct-cut”, “acetate” or “lacquer” discs), followed by CD-A, DAT, Compact cassette, and the very old phonograph cylinders³⁸.

38 For an analysis of the different types of carriers, read part I of *Audio and video carriers*, Dietrich Schüller. Web version: http://www.tape-online.net/docs/audio_and_video_carriers.pdf

In terms of their amount in hours, cylinders and instantaneous discs, which can only hold short recordings, may not constitute a significant portion of the total audiovisual heritage. However, they are generally considered the most at-risk material, due to the fact that they are often unique recordings, and their handling is extremely difficult due to their physical fragility³⁹.

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

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

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

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

Aside from the deterioration of the carrier, what has truly become a commonly perceived threat, perhaps even worse for the future of information retrieval are the obsolescence and the relative lack of availability of original equipment for playback. Maintaining the availability of playback equipment will become an increasingly serious problem⁴⁰.

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

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

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

40 Dietrich Schüller, *Audiovisual research collections and their preservation*. Web version: http://www.tape-online.net/docs/audiovisual_research_collections.pdf

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

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

The strong point concerning the Music and Sound Archives Community, is that from a technical point of view, it is a quite structured one: common technical choices and procedures are widely spread for traditional material⁴¹, it is then important to concentrate on new issues regarding the evolution of the Community and the implications of this evolution from a preservation point of view.

3. The world of Music Archive

Two types of music archives are identified:

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

Different actors are concerned:

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

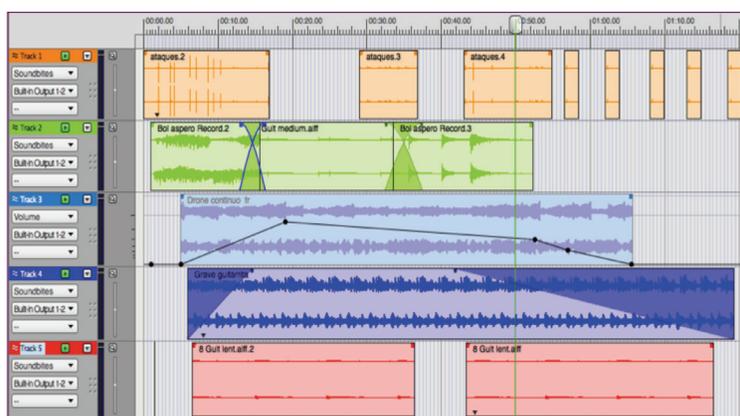


Figure 2 – Image of the mixing window of a sound sequencer. Each track contains one stereo sound. Sounds can be segmented, repeated, superposed, controlled in intensity (track 3) or with initial and ending fades (track 4). The resulting file can range from a mono file to any number of files; linked among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

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

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

To summarise the encountered problems:

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

3.1. Preserving the production environment and the knowledge associated

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

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

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

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

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

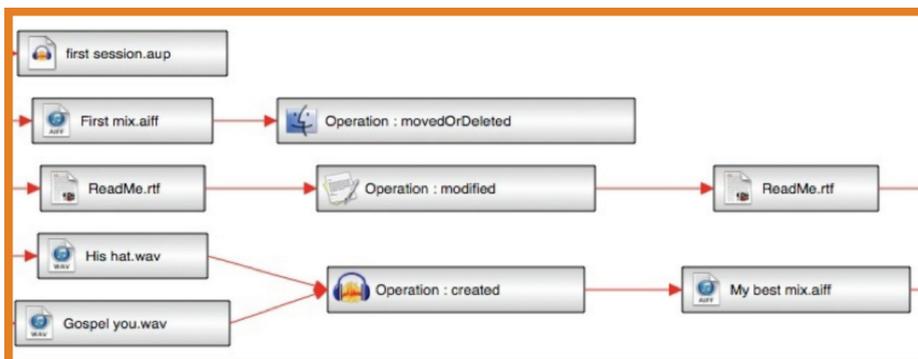


Figure 3 – Image of the File-tracker developed by the Gamelan project where a structured timeline of all the actions is kept and enriched easily by the operator

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

4. Conclusions

For the sound archive community, as said earlier, the situation is quite clear and there are important literature^{42,43} and publications⁴⁴ concerning digitisation, quality, and preservation. There are no major issues concerning the preservation of sound itself. Digitisation of audio carriers has been done for a long period of time and the formats and methodologies are clearly established.

However a major unsolved issue was encountered with the preservation of music production recordings, for which no substantial action has been undertaken and the major production centers for classic, contemporary, or popular music face the danger of losing most of their collections due to complex preservation environments and lack of descriptive information permitting the understanding of the preserved contents. It is important to aggregate a large amount of content holders from musical production and share some of the already existing outcomes. Some European projects such as FP6 CASPAR⁴⁵ and the French ANR project GAMELAN⁴⁶ have dealt with these issues and are starting to propose partial solutions. Presentations of these findings are expected to be given in international conferences, such as the EMS conference⁴⁷ in Berlin in 2014, which is dedicated to specialists of contemporary musical production.

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

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

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

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

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

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