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

Connecting Cultures: Content, Context, and Collaboration

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

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

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

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

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

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

For any further information or questions please contact the Organizing Committee and the conference administrator through enquiries@iasa-conference.com.

**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**



After an eventful conference this year in Vilnius, Lithuania, I invited many of the speakers to include their papers in this issue of the IASA journal. Eleven of our colleagues acquiesced, with exuberance I should add, and because of their willingness to share their work, this issue covers a wide spectrum of the field of audiovisual archives from input to output, including international standards development for preservation and storage, research on preservation and disaster management, ethics and intellectual property rights, digitization, online access, and academic inquiry.

To open the issue, Kurt Deggeller offers a history and a call to action with his analysis of the development of the core international audiovisual associations and their relationship to other social and cultural memory organizations worldwide. Is the splintered nature of these audiovisual heritage associations a good thing for the field?

Things fall apart, but when they do, it is important to understand why they did and how you might prevent the same thing happening again in the future. In some ways you may call the second and third papers in this issue a precursor (or supplement) to the upcoming release of TC-05 Handling and Storage of Audio and Video Carriers (edited by Häfner and Schüller). At this year's conference in Vilnius, Albrecht Häfner delivered an in-depth workshop on disaster preparedness for audiovisual collections. Häfner culled many guiding documents from UNESCO, ICA, and national libraries and here he synthesizes them, updating practices as necessary with his own experiences, into a thorough tutorial for disaster preparedness. In the previous IASA journal (Issue 41), Kara Van Malssen shared a detailed case study on disaster recovery. These two articles together (Van Malssen and Häfner) will serve as a tremendous resource (or refresher) for audiovisual collections managers.

Disasters are often unexpected, and we need to know how to prepare for them to minimize or avoid loss. On the flip side, all things are constantly in a state of decay and if we know why they decay we can work to slow the entropy down. Sticky shed syndrome is one example where we understand the effect of decay, but we do not fully understand why it happens. Dietrich Schüller, and a few of his colleagues, took an oral history approach to the problem and sat down to interview engineers and technicians who had direct experience with tape manufacturing at some of the biggest manufacturers in the world. Although their findings were many, in this issue Schüller's analysis of some of these interviews offers an important contribution to our understanding of the manufacturing causes of Sticky Shed Syndrome.

The concepts behind MXF and AXF are often hidden behind the ambiguity of their names. Since we had papers on each of these standards at this year's conference, I thought this might be a good opportunity to place them side by side to show the differences between the two: one deals specifically with digital video as a wrapper; the other is a generic method for ensuring media-independent digital storage management. Speaking on behalf of the MXF AS-07 development team, Carl Fleischhauer provides a status report and a thorough overview on the development of the MXF AS-07 specification for archiving and preservation. Nicole Jacquemin, representing Front Porch Digital, offers an explanation of AXF and an appeal for its benefits in the context of Content Storage Management (CSM).

Without access there is no preservation; without preservation, no access. Representing the world of data aggregation for public access, Erwin Verbruggen submits an overview of EUscreenXL, an extension of the EUscreen framework in the Europeana environment. Although currently the least represented type of content available through Europeana, audiovisual content is the most frequently accessed type of content in Europeana. EUscreenXL is an emerging effort to enlarge the quantity and diversity of European audiovisual heritage accessible through the Europeana portal.

Another issue related to access of audiovisual collections is the real difficulty archives face with regard to oral history collections and making these available online to a general or closed public. In this issue, our colleagues Myriad Fellous-Sigrist and Véronique Ginouvès offer insight into their efforts in France. Issues range from intellectual (e.g., rights, per-

missions, and sensitive content) to technical (e.g., efficient transcript creation, real-time search and retrieval, and controlled vocabularies). Fellous-Sigrist and Ginouvès illustrate the decisions that have been made on their projects and they introduce us to a new guideline being drafted in France to aid archivists and oral historians with the creation of, preservation of, and access to personal narrative and oral history collections.

Two of our colleagues, in this issue, offer insight into the collections and work going on at their institutions. Since the conference was hosted in Lithuania this year, I'm happy to see a paper from the National Library of Lithuania. Živilė Časaitė shares the audiovisual history of the institution, the makeup of its audiovisual collections, and the access and preservation efforts underway currently. Representing the Austrian Mediathek, Hermann Lewetz covers the AM's recent foray into video digitization and access. Contrasting initial goals with ultimate decisions, Lewetz provides insight into the dilemmas of contemporary video digitization projects.

Two of our colleagues in this issue are looking at audiovisual archives from the outside, asking who is using the collections and how are they interacting with them? Tedd Urnes, over the course of thirteen years, has wondered why historians are not more acclimated to using audiovisual resources in their research. Urnes offers us an essay on the subject, noting a combination of factors, some the fault of archives, others of researchers' sensibilities or habits. At the University of Copenhagen, Budhaditya Chattopadhyay is researching the effects of the digital world on film soundtracks and the public's interaction to them. Chattopadhyay shares an overview of his research project and a preliminary examination of what he thinks he may find as he continues his work.

This issue of the IASA journal is diverse in its concerns. It contains numerous perspectives on what it means to work in the world of audiovisual archives. These perspectives are just a few of the many issues facing us as we work towards a common goal of collecting, preserving, and providing access to the audiovisual heritage of our world. The next issue will come out in June 2014 (deadline for submissions will be March 31, 2014). As I begin to think about this next issue, I want to encourage submissions that respond to what I think are three growing problems for audiovisual archives today: continued entropy and decay in collections; big data management and infrastructure; and intellectual property rights. Please consider submitting an article covering one of these topics or the results of research that would be of interest to the IASA membership.

Bertram Lyons
Editor IASA

The long tail of the global financial crisis and the ongoing cooling of the economic climate has manifested what appears to be an internationally shared phenomenon: a gradual reduction in funding, which we have seen in sound and audiovisual archives and which appears to be shared amongst cultural and collecting institutions generally. The impact of these funding constraints has been felt strongly amongst publicly funded collections, which is the sector from where most of our member institutions come. Overwhelmingly, the IASA institutional members' focus is now on how we can safely and securely manage our collections and ensure their long-term persistence while confronting the issue of reduced resources to undertake the task.

In the face of such shared difficulties there is much that IASA members can do to support each other. The expertise in knowing how to undertake these tasks, as well as the knowledge of where savings can be made is to be found amongst our members. More importantly, the network is able to provide support to each other in making those tough decisions while representing the need to maintain appropriate standards.

The annual conference, of course, is the best place to share in that expertise, contribute to the pool of knowledge, and build the support networks that enable us to do this job in a challenging international environment. This year's conference will be held in Cape Town, South Africa, from 5-9 October 2014, and is titled *Connecting Cultures: Content, Context, and Collaboration*. It promises to be an inspiring event informed by the dynamic and diverse natural and cultural landscapes of South Africa. With your participation in this auspicious meeting we will together connect cultures and open many ways for collaboration, which will ensure the safeguarding of our valuable sound and audiovisual heritage.

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

IASA itself must also take note of the impact of this economic change amongst our members. One observation is that after the work of the board in cleaning up and clarifying the membership list, and enforcing membership, we now have a larger and growing membership. However, the increase has been in individual memberships and this has been partly mirrored by a reduction in institutional membership, the net result of which is a reduction in membership income. The international and representative work IASA has been undertaking has been expanding, and the cost of undertaking this work has risen as well. There has not been an increase in membership costs for many years, and the board has decided to ask the membership to approve a slight increase in membership costs. The details of this will be circulated to all members prior to the next conference, and we hope that the shared benefit that we all receive from IASA will make the increase palatable.

In a very exciting announcement, I am pleased to announce that Tommy Sjöberg has allowed the IASA Executive Board to co-opt him into the position of Treasurer for the remainder of this board's term. Tommy is, I am sure, familiar to you all. He has had a diverse career; a former aeronautical engineer he has been working with sound recordings in archives since 1996. Tommy was responsible for digitizing master tapes at the CD plant DCM, Stockholm, and he has worked at *Svenskt visarkiv*, Stockholm (Centre for Swedish folk music and jazz research) 2003-2007 and the (Folk music house), a regional archive, since 2008. We are very grateful to Tommy for undertaking this task.

Still, time has not stood still, and the term of this Executive Board will be completed at our Cape Town conference. 2014 is an election year for the IASA Executive Board, and a chance for you to become involved in shaping the direction of our organization, and contributing to the future of sound and audiovisual archives. Eight positions on the Executive Board are up

for election: President, three Vice-Presidents, Secretary-General, Treasurer, Editor, and Web Manager. All IASA members in good standing interested in serving on the Executive Board, or who would like to suggest others who could take up the challenge, should feel free to contact any member of the Nominating Committee by mid-February.

The nominating committee is made up of Richard Green (chair) richard.green@bac-lac.gc.ca or [greencaron@sympatico.ca](mailto:greenaron@sympatico.ca), Christiane Fennesz-Juhasz Christiane.Fennesz-Juhasz@oeaw.ac.at, and Will Prentice Will.Prentice@bl.uk. All necessary information can be found on our website.

I look very much forward to seeing you in Cape Town in October, and to welcoming new members of the board after the conference is over.

*Soundly yours,
Jacqueline von Arb, President*

ESTABLISHING COMMON PLATFORMS FOR JOINT INITIATIVES IN THE HERITAGE FIELD

Kurt Deggeller (representative of IASA in UNESCO, representative of CCAAA in LAMMS, former convenor of CCAAA, Basel, Switzerland)

In this paper I would like to illustrate what has occurred in the history of the International Association of Sound and Audiovisual Archives (IASA) in the last thirty years and what is currently the purpose of IASA and other non-governmental organizations (NGOs) active in the field of audiovisual archives among the international associations of heritage institutions.

1. From “sound” to “sound and audiovisual”

In 1984, when I joined IASA, the organization was still the International Association for Sound Archives and the annual conferences were organized together with the International Association of Music Libraries, Archives and Documentations Centres (IAML), from which IASA had separated in 1969. One of the main topics of the annual conference which took place in Como (Italy) was “Sound archives—from separation to integration.” The papers on this topic were published in the *Phonographic Bulletin* (the title of the IASA Journal at that time). In his introduction, Rolf Schuurmsma, Librarian-in-Chief of the Erasmus University Rotterdam, an important scholar active in IASA and IAML, wrote these most interesting lines:

“More and more collections of sound recordings become part of an institution with a wider aim, be it library, broadcasting organisation, national archive or museum. There may not be more than a loose connection between the different departments of such an institution, but even then there is a beginning of integration. ... New technical developments like the digital way of recording may also bring about changes towards greater integration.”¹

The discussion about integration at that time concerned sound and moving image documents, the latter in form of video, because film was the domain of FIAF (International Federation of Film Archives), the eldest NGO in the audiovisual area. The articles following this introduction came from Leif Larson, National Archive of Recorded Sound and Moving Images (ALB) Stockholm; Sam Kula, National Film, Television and Sound Archives, Ottawa; and David Lance, Australian War Memorial, Canberra.

In his article on the ALB established in 1979 as an institution separated from the National Library, which until then had been in charge of audiovisual heritage, Leif Larson wrote:

“My contribution to this session can be concluded as being a strong plea for radical integration regarding the internal handling for various media. There is an implicit warning, however, against integration of an institution for preservation of video and audio materials within a bigger unit, be it the National Library or the National Archives.”²

At that time, many colleagues agreed on the opinion that the institutions in charge of audio-visual preservation should be independent from larger institutions, such as national libraries and national archives. However, the development (at least in Europe) went in the opposite direction:

1 Rolf Schuurmsma, “Sound Archives – from Separation to Integration,” *Phonographic Bulletin* 40, (November 1984): 17.

2 Leif Larson, “From Separation to Integration – the Swedish Experience,” *Phonographic Bulletin* 40, (November 1984): 21.

- In 1983, the British Institute for Recorded Sound joined the British Library and became British Library National Sound Archive and later British Library Sound Archive.
- In 1994, the Département de la Phonothèque Nationale et de l'Audiovisuel had been renamed Département de l'Audiovisuel and integrated into the New Bibliothèque Nationale de France.
- And 2009, in Sweden the audiovisual collections were moved back from the ALB to the National Library.

In December 1995, IASA members, after a debate which had lasted for ten years, decided on a change in IASA's scope: the Association would in future deal not only with sound, but also with audiovisual matters, and changed its name to International Association of Sound and Audiovisual Archives.³

The Executive Board's draft working plan for 1997–1999, published only in January 1999, shows how this expansion would affect future cooperation:

“Concept for the integration of audiovisual matters into IASA's scope:

Following the draft working plan 1997–1999, IASA needs:

4. To cooperate with institutions experienced in the AV field

Apart from the branches and the affiliates, there are associations such as FIAT (International Federation of Television Archives) and FIAF (International Federation of Film Archives), but other organizations such as AMIA (Associations of Moving Image Archivists), AVICOM (ICOM International Committee for Audiovisual and New Technologies of Image and Sound), ICA (International Council on Archives), IFLA (International Federation of Library Associations and Institutions), etc. should be considered.”⁴

2. From the “Roundtable” to CCAAA

In fact a kind of cooperation has occurred since 1979, when with the help of UNESCO the Roundtable on Audiovisual Records was established. The Roundtable assembled the associations of IASA, FIAF, and FIAT, and the Audiovisual Committees of ICA and IFLA and organized through its Technical Coordinating Committee (TCC) since 1983 the Joint Technical Symposium—a gathering of specialized technicians in film, video, and sound preservation.

In 2000, the Roundtable became the Coordinating Council of Audiovisual Archives Associations (CCAAA), thanks to the initiative of two IASA presidents: Sven Allerstrand (ALB) and Crispin Jewitt (British Library Sound Archive). CCAAA is an umbrella organization for associations dealing with audiovisual matters. In CCAAA's terms of reference its aim is defined as follows:

“CCAAA is a network of relevant international non-governmental organisations dealing with all aspects of audiovisual archiving on a professional level speaking with common voice with the aim of promoting and encouraging the recognition of the audiovisual heritage as part of the world's cultural and documentary

3 An interesting summary of the discussions can be found in: Helen P. Harrison: “IASA Future and External Relations,” *Phonographic Bulletin* 61 (November 1992): 28–33.

4 “IASA Business,” *IASA Journal* 12 (January 1999): 7.

heritage, the preservation and the accessibility of the audiovisual heritage on an international level.”⁵

CCAAA has two categories of members. Category A members are associations whose main activity is audiovisual archiving. They pay the full membership fee and have two votes on issues that are decided by ballot. Category B members are affiliated associations whose activities include audiovisual archiving. They pay a reduced membership fee and have one vote on issues that are decided by ballot.

The Category A members are:

- Association for Recorded Sound Collections (**ARSC**)
- Association of Moving Image Archivists (**AMIA**)
- Federation of Commercial Audiovisual Libraries (**FOCAL**)
- International Federation of Film Archives (**FIAF**)
- International Federation of Television Archives (**FIAT-IFTA**)
- International Association of Sound and Audiovisual Archives (**IASA**)
- Southeast Asia-Pacific Audiovisual Archive Association (**SEAPAVAA**)

The Category B members are:

- International Council on Archives (**ICA**): Photographic and Audiovisual Archives Working Group
- International Federation of Library Associations and Institutions (**IFLA**): Audiovisual and Multimedia Section

ICA and IFLA are not associations of institutions specialized in audiovisual archiving. Nevertheless, both are represented by groups of specialists from large non-specialized institutions.

In 1988, Leopold Auer, former Secretary for Publications in ICA, explained to the IASA General Assembly why ICA had its own activities in the audiovisual field:

“In the world of AV media ICA is a comparative newcomer and you will perhaps ask yourself whether it has been necessary to duplicate already existing efforts and to establish new bodies while already existing ones in the field face grave problems. This question raises the problem of relationship to be developed between ICA and sister organisations at the international level. It is at the same time a repetition of the question for the relationship between public archives and specialized archival institutions such as sound or film archives at the national level.”

He ended with an observation concerning the problem of sharing responsibilities for the audiovisual heritage in the framework of a national archival policy:

“What is important is not which institution is taking the responsibility for which type of archives but that this responsibility is taken at all by whomever so that the archival policy of a country may form a coherent pattern.”⁶

5 www.ccaaa.org/what.html. See also: Bruce Royan, “Saving Fading Heritage: the Coordinating Council of Audiovisual Archives Associations,” *Alexandria* (21[3] 2011): 55-63.

6 Leopold Auer, “Statement addressed to the General Assembly of IASA, 16 September 1988,” *Phonographic Bulletin* 53 (March 1989): 37-38.

The role of ICA and IFLA obviously goes beyond the representation of the written portion of cultural heritage and the community of archives and libraries. Thanks to their involvement in numerous international bodies such as UNESCO, WIPO (World Intellectual Property Organization), and the International Council of the Blue Shield they are important players in the process of shaping the future of the knowledge society.

Since it was established in the year 2000, CCAAA has organized three Joint Technical Symposiums and, since 2007, has coordinated the UNESCO World Day for Audiovisual Heritage which was established by the General Conference of UNESCO in 2005. Some activities dealt with the field of training but the members could not agree on a consistent co-operation in this field. CCAAA has the status of observer in the UN-agency WIPO (World Intellectual Property Organisation) and is recognized by the Communication and Information Sector of UNESCO without being in an official relationship with the organization. An official relationship would be possible only on the condition that the Category A members give up their individual relationships with the organization.

3. Libraries, archives, museums, monuments, and sites (LAMMS)

In 2008, IFLA took the initiative to convene an informal group of prominent NGO representatives active in the heritage field, including organizations of archives, museums, monuments, and sites. This was the outcome of a working group of the IFLA Governing Board which focused on advancing the convergence agenda.

In a draft policy paper which was discussed during the IFLA World Conference at Helsinki in 2012, IFLA gave the following definition of convergence:

“Convergence is not aimed at merging collections or organizations, but upon enhancing, improving, and/or stabilizing cooperation among Libraries, Archives, Museums, Monuments, and Sites.”

The LAMMS group currently has five members and two observers.

Members:

- International Council on Archives (**ICA**)
- International Federation of Library Associations and Institutions (**IFLA**)
- International Council of Museums (**ICOM**)
- International Council on Monuments and Sites (**ICOMOS**)
- Coordinating Council of Audiovisual Archives Associations (**CCAAA**)

Observers:

- Conference of Directors of National Libraries (**CDNL**)
- International Council for Scientific and Technical Information (**ICSTI**)

Its terms of reference read as follows:

“The five international organisations for cultural heritage, IFLA (libraries), ICA (archives), ICOM (museums), ICOMOS (monuments & sites), and CCAAA (audiovisual archives), have a long-standing relation of cooperation and are now agreed to intensify cooperation between their organisations in those areas where libraries, archives, museums, monuments, and sites have mutual interests and activities.”⁷

7 www.ifla.org/about-lamms/.

In the agenda of the group we can find the following activities:

- Copyright and other legal matters
- Political lobby
- Preservation and protection of cultural heritage
- Global digital libraries
- Standardization

In the copyright field, IFLA and ICA are participating in the debates of the Standing Committee on Copyright and Related Rights of the UN-Agency WIPO (World Intellectual Property Organisation). Current exceptions and limitations of copyright for archives and libraries are in discussion and IFLA has published a proposal for a treaty. There is also in discussion a treaty for Copyright Limitations and Exceptions for the Visually Impaired and the Protection of Broadcast Organisations.

On the political side IFLA is at the origin of manifestos endorsed by UNESCO on topics such as Internet, Multicultural Library, or Digital Library. UNESCO has also endorsed the Universal Declaration on Archives, prepared by ICA and Principles of Access to Archives are currently being discussed by the ICA membership. ICOM and ICOMOS were particularly active in the field of preservation and protection of cultural heritage under the framework of the Blue Shield organization. Numerous armed conflicts and natural disasters in the last few years have shown how fragile and permanently endangered heritage of all varieties has become in the world and consequently the importance of coordinated actions of the NGOs.

The members of LAMMS have adopted a Statement of Principles on Global Cross Sectorial Digitisation Initiatives which contains a shared vision for global heritage and promotes long-term access to cultural heritage. At the beginning of the statement is a long term vision for the development of a global digital library proposed by the Conference of Directors of National Libraries (CDNL) in 2008. This meets the two final points of the agenda on "Global digital libraries" and "Standardization."

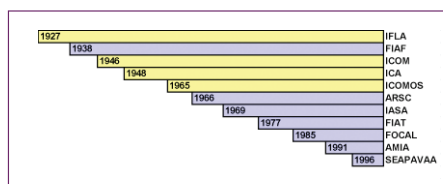
My concern as a representative of the CCAAA in the LAMMS council is that the members of CCAAA do not seem to be particularly interested in this agenda. This is a pity because all its points are directly concerned with problems of preservation and accessibility of audiovisual heritage.

Concerning copyright, access to audiovisual heritage is still difficult because only a small portion is in the public domain and the numerous neighbouring rights are complicating the situation.

In UNESCO, CCAAA has no official status because some of its Category A members already have official relationships with the organization. As a result there is no common policy on audiovisual matters and no coordination with ICA and IFLA possible.

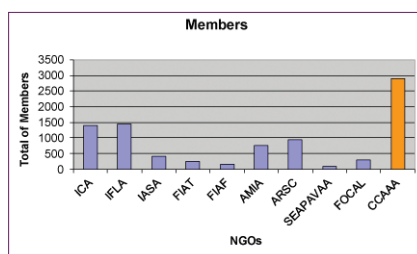
We all know that audiovisual heritage is also threatened by natural disasters and armed conflicts around the world. There were very few initiatives from NGOs during the last decade to help rescue endangered audiovisual heritage. CCAAA had been invited to be a member of the International Committee of the Blue Shield (ICBS), but due to its weak structure it had to back out when ICBS planned its incorporation.

The current situation is the result of a historical development. The following table shows the chronology of the establishment of the NGOs in the heritage field:



It is not astonishing that the NGOs of the audiovisual community are younger than those who are working in the field of written heritage, museums, monuments, and sites. But we can also see that between 1966 and 1996 six organizations representing the audiovisual heritage were established. This meant an extreme fragmentation of the community, which is probably the main reasons for its weakness.

The direct consequences of this fragmentation can be shown by a comparison of the membership figures. In the following table, ICOM and ICOMOS are missing. If I had considered their membership figures (30,000 for ICOM, 9,500 for ICOMOS) the audiovisual associations would have disappeared from the table.



The last column shows that together, CCAAA category A members represent a group with more members than ICA or IFLA, but due to the different scopes of the organizations a merger of all CCAAA members is not possible. It is interesting to see that in the time of the Round Table, this problem had been discussed. Helen Harrison, Secretary General of IASA reported from a meeting held in 1989, in Brussels:

“David [Francis, representative of FIAF] went on to consider the areas of cooperation between the Archives Associations. IASA, FIAF, and FIAT obviously [they] have a common purpose on the technical front and there are other areas of mutual interest. While not advocating any sort of merger of the Associations, it would be worth exploring a biennial meeting on a topic of mutual interest, albeit retaining separate identities and business sessions as well. The Associations could hold separate conferences in the alternate years and still retain their own identity.”⁸

Since then, the situation has changed in many ways:

After the establishment of CCAAA other associations have joined the group, mainly ARSC and AMIA which jointly represent more members than IASA, FIAT and FIAF together. Their scopes, however, are nearer to IASA than to FIAT and FIAF which address a particular genre of institutions: Film archives for FIAF and Television Archives for FIAT.

8 Helen P. Harrison, “IASA Future and External Relations,” *Phonographic Bulletin* 61 (Nov. 1992): 33.

The mission statement of AMIA reads:

“AMIA is a non-profit international association dedicated to the preservation and use of moving image media. AMIA supports public and professional education and fosters cooperation and communication among the individuals and organizations concerned with the acquisition, description, preservation, exhibition and use of moving image materials.”⁹

And ARSC's aims are:

“The Association of Recorded Sound Collections is a non-profit organization dedicated to the preservation and study of sound recordings in all genres of music and speech in all formats and from all periods. ARSC is unique in bringing together private individuals and institutional professionals everyone with a serious interest in recorded sound.”¹⁰

Together the two associations cover the field of sound and moving image, both contained in the mission statement of IASA:

“IASA supports the exchange of information and fosters international co-operation between audiovisual archives and other interested in the field especially in the areas of acquisition and exchange, documentation and metadata, resource discovery and access, copyright and ethics, preservation and conservation, research, dissemination and publication, digitisation of media content.”¹¹

The three mission statements contain many common interests and goals which could form a large platform of common activities. But from the point of view of IASA is there a need for such a platform?

4. Conclusions and recommendations

Due to the integration of audiovisual collections in large generalist institutions, mainly national libraries and national archives, the profile of people interested in IASA's activities has changed: instead of senior managers of institutions specializing in audiovisual heritage, persons with specific skills necessary for supervising audiovisual collections are active in the association. Their aim is to become informed and trained on new developments in the field and learn from the experiences of colleagues from other institutions.

To justify membership in IASA and the participation in a IASA conference they have to prove to managers, who often know very little or nothing about audiovisual heritage and audiovisual associations, that IASA provides substantial information in audiovisual matters through its website and its publications and that the conference programs contain elements which can improve the professional skills of the participants through tutorials and workshops.

In other words, not the identification with IASA as an organization, but the value of providing information and training will contribute to the elevation of professional levels of audiovisual archiving of institutions. This is the main argument for membership and participation in the conferences. Therefore, IASA finds itself in a competition with other organizations offering

9 www.amianet.org.

10 www.arsc-audio.org.

11 www.iasa-web.org/activities/.

similar “products” and the association has to develop a marketing strategy if it wants to survive in this competition.

The advantage of IASA in this competition is that a large range of capacities are represented in the membership. The disadvantage is the size of the organization, which has limited financial resources, therefore it does not allow for even a small staff of professionals to be in charge of developing and promoting the content of IASA’s program.

As a substantial increase in the finances of the association does not seem realistic, IASA has to find partnerships with other associations active in the same field. A possible loss of identity seems to me a minor disadvantage in comparison to the danger of becoming insignificant and sooner or later condemned to disappear.

DISASTER PREPAREDNESS, RESPONSE, AND RECOVERY

Albrecht Häfner (Sinzheim, Germany)

Editor's note: The content here draws heavily from the list of resources found in the bibliography at the end of this article.

1. Introduction

The previous IASA journal published Kara Van Malssen's report about "The Recovery of EyeBeam Art&Technology Center's Multimedia Collection Following Superstorm Sandy." This case study gives extreme evidence that disaster preparedness is an urgent need for any archive even if it is a tiresome practice.

1.1. Definition

Risks, hazards, or dangers are threatening events. If they happen they may trigger a disaster, an emergency, or a catastrophe. The resulting impacts are different depending upon the nature of the triggering events.

Hazards/risks may develop into a disaster/emergency.

1.2. Basics

The word disaster is presumably derived from the Latin *dis astro*, which is interpreted as mis-star, bad star, or unlucky star, meaning mishap, collapse, catastrophe, calamity, fiasco, or debacle. Generally, a disaster is an unexpected event as a result of a risk or a hazard; it is an emergency for any living being, human beings as well as animals, and objects of all kinds. That is why the terms disaster and emergency are used synonymously in this context.

An archives disaster is an unexpected event that puts collections at risk. No institution can be excluded from or is immune to the possibility. Disaster planning is a matter of basic security for archives, their staff, and their collections. It is considered to be an essential part of any preservation programme to be implemented by any kind of archives.

2. Disaster management

Generally, disaster management or emergency management is the discipline of dealing with and avoiding risks. It is a discipline that involves preparing for disaster before it occurs, disaster response (e.g., emergency evacuation, quarantine, or mass decontamination), and supporting and rebuilding society after natural or human-made disasters have occurred. In general, emergency management is the continuous process by which all individuals, groups and communities manage hazards in an effort to avoid or ameliorate the impact of disasters resulting from hazards. Effective emergency management relies on a thorough integration of disaster/emergency plans at all stages that can be used to guide governmental and non-governmental involvement.

Practitioners in disaster preparedness come from an increasing variety of backgrounds. Professionals from memory institutions (e.g., museums, historical societies, libraries, and archives) are dedicated to preserving cultural heritage—objects and records contained in their collections and holdings. This has been an increasingly major component within these fields as a result of the heightened awareness following the September 11 attacks in 2001, the hurricanes in 2005, the collapse of the Cologne Archives, and the impact of superstorm Sandy in 2012.

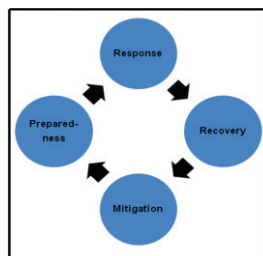
2.1. The eight principles

There are eight principles with which an emergency manager must comply:

1. **Comprehensive:** emergency managers consider and take into account all hazards, all phases, all stakeholders, and all impacts relevant to disasters.
2. **Progressive:** emergency managers anticipate future disasters and take preventive and preparatory measures to build disaster-resistant and disaster-resilient communities.
3. **Risk-driven:** emergency managers use sound risk management principles (hazard identification, risk analysis, and impact analysis) in assigning priorities and resources.
4. **Integrated:** emergency managers ensure unity of effort among all levels of government and all elements of a community.
5. **Collaborative:** emergency managers create and sustain broad and sincere relationships among individuals and organizations to encourage trust, advocate a team atmosphere, build consensus, and facilitate communication.
6. **Coordinated:** emergency managers synchronize the activities of all relevant stakeholders to achieve a common purpose.
7. **Flexible:** emergency managers use creative and innovative approaches in solving disaster challenges.
8. **Professional:** emergency managers value a science- and knowledge-based approach, based on education, training, experience, ethical practice, public stewardship, and continuous improvement.

2.2. The emergency cycle: four phases

An academic trend is towards using the term disaster risk reduction. This focuses on the mitigation and preparedness aspects of the emergency cycle. The process of emergency management involves four phases: preparedness, response, recovery, and mitigation.



2.2.1. Preparedness

Preparedness is a continuous cycle of planning, organizing, equipping, exercising, evaluating, and improving activities to ensure effective coordination and the enhancement of capabilities to prevent and protect against natural or man-made disasters.

Common preparedness measures include:

- Communication plans with easily understandable terminology.
- Proper maintenance and training of emergency services.
- Development of staff warning methods.
- Maintenance of disaster equipment.
- Staff training for the case of disaster.

Another aspect of preparedness is damage prediction. This gives planners an idea of what resources need to be in place to respond to a particular kind of event.

2.2.2. Response

The response phase includes the mobilization of the necessary emergency services and first responders in the disaster area, for example, core emergency services such as fire fighters and ambulance crews. They may be supported by a number of secondary emergency services such as specialist rescue teams. In responding to a disaster there is a need for both discipline (structure, doctrine, process) on the one hand and agility (creativity, improvisation, adaptability) on the other.

Recommendations for preparedness must be achievable and will depend on many factors including:

- Availability of funds.
- Availability of facilities.
- Availability of trained personnel.

2.2.3. Recovery

The aim of the recovery phase is to restore the affected area to its previous state. Recovery efforts are primarily concerned with actions that involve the repair of essential infrastructure and rebuilding destroyed equipment. Efforts should be made to “build back better,” aiming at reducing the pre-disaster risks.

2.2.4. Mitigation

The implementation of mitigation strategies can be considered part of the recovery process if applied after a disaster occurred. Mitigation efforts attempt to prevent hazards from developing into disasters altogether, or to reduce or, even better, to avoid the effects of disasters when they occur. Mitigation differs from the other phases because it focuses on long-term measures for reducing or eliminating risks. Measures for mitigation can be structural or non-structural. Structural measures use technological solutions, e.g., flood levees. Non-structural measures include legislation or insurance. A precursor activity to mitigation is the identification of risks. Physical risk assessment refers to the process of identifying and evaluating hazards. The higher the risk, the more urgent are preventive measures against the hazard by mitigation and preparedness efforts. Mitigation is the most cost-efficient method for reducing the impact of hazards. It is, however, not always suitable.

3. Principal causes of disasters

Natural disasters cannot be prevented, but measures can be taken to eliminate or reduce the possibility of trouble. Regardless of the many forms a disaster may take, the actual damage to collections is usually caused by water or fire. Even when they are not the initial factor, floods and fires almost invariably occur as secondary causes of archives disasters.

First, we need to distinguish between natural and man-made disasters.

3.1. Natural disasters

- Rain and wind storms (heavy thunderstorms, cyclones, tornados, hurricanes)
- Bush fires
- Floods, tsunamis
- Landslides
- Avalanches
- Biological agents (micro-organisms, insects or vermin infestation)
- Earthquakes
- Volcanic eruptions

3.2. Man-made disasters

- Acts of war and terrorism
- Civil disturbances, social struggles
- Water (broken pipes, leaking roofs, blocked drains, fire extinguishing)
- Fire
- Explosions
- Liquid chemical spills
- NEMP (Nuclear ElectroMagnetic Pulse)
- Building deficiencies (structure, design, environment, maintenance)
- Power failures, outages
- Criminal activities such as theft, vandalism, burglary, looting
- Absence of surveillance, maintenance, and security routines
- Gaps in the line of supervision and responsibility, when changes in the executive staff take place
- Ignorance of the risks due to high temperature together with high relative humidity
- Obsolescence if ignored—chemical obsolescence as well as format obsolescence
- Negligence and carelessness of staff, lack of skills, and lack of foresight

3.3. Some major effects of disasters on AV material (in particular fire and water)

Concern has to be given to the fact that AV archives hold collections that are unique and that disasters can destroy them forever (contrary to libraries where most books exist in other libraries).

These are the most common AV carriers:

Mechanical carriers

- Cylinders (wax, celluloid)
- Grooved discs (wax, shellac, vinyl, acetate, laminates)

Magnetic carriers

- Open reel
- Cassette/cartridge

Optical carriers

- CD
- DVD
- BluRay
- MiniDisc
- MOD
- LaserVision

Film, photographs

- Nitrate
- Diacetate
- Triacetate
- Polyester

Mechanical instrument devices

- Rolls
- Music box discs

Not to forget: all backup materials such as cardboard boxes, sleeves, cases, books, containers and any other combustible, in particular paper-based material.

The only method to avoid destruction is to digitize the AV documents and store at least two copied files of each item at different sites. Consequently, the necessary IT devices, hardware as well as software, are objects with increasing significance for disaster planning.

The following two sections focus on the impacts of disasters most common in AV archives: fire and water.

3.3.1. Fire

Fire prevention and extinguishing must be given utmost importance. Beyond the safeguarding of invaluable material it must be understood that burning audio-visual carriers produce highly toxic fumes, which are of considerable risk to health. In addition to irreplaceable losses of holdings, complicated and expensive decontamination of premises may be the result of such incidents. Any audio-visual material can be completely destroyed or damaged beyond repair, as a result of fire extinguishing. The large quantities of water used for fire fighting may cause considerably more damage than the fire itself.

3.3.1.1. How do fires occur in AV archives?

Fires may result from natural phenomena such as lightning or earthquakes, or from unnatural events such as wars, terrorist activities, or arson. However, the primary threat of fire in libraries and archives is caused when fire safety rules are ignored or not adopted in the first place.

The highest fire risk is posed by motion film recorded on cellulose nitrate. Cellulose nitrate is the plastic commonly used for film-based photographic materials (stills, movie, and X-ray films) manufactured up to the early 1950s. It contains a high proportion of nitro-cellulose, otherwise known as celluloid. Cellulose nitrate is extremely flammable. The most dangerous aspects of cellulose nitrate motion picture film are its ease of ignition, its very high rate of combustion, and its extremely poisonous combustion gases. Therefore, cellulose nitrate film should not be stored in an AV archive. If it is not possible to copy the film onto a safety base film, then it should be stored in a separate building in a vault especially constructed for this purpose.

The high fire risk from cellulose nitrate film increases as it ages. Old cinematographic films and old photographic negatives (including X-ray films) may be made from cellulose nitrate.

It is hazardous because:

- It can start to decompose and become unstable at temperatures as low as 38°C, giving off large quantities of poisonous gases, which could cause an explosion; warmth and humidity (moisture) accelerate this decomposition.
- It catches fire very easily and burns extremely quickly, with a hot and intense flame.
- It produces very dense, poisonous smoke containing copious amounts of choking nitrogen dioxide fumes.
- Unlike many other flammable materials, nitro-cellulose does not need the oxygen in the air to keep burning and once it is burning it is extremely difficult to put out. Immersing burning film in water may not extinguish the fire and it could actually increase the amount of smoke produced.

Keep them away from any source of heat (e.g., radiators and light bulbs). Do not run cellulose-nitrate film through a projector or put negatives on an enlarger; they can catch fire simply from the heat from the lamp or from friction caused by the film passing over the projector sprockets. On no account should cellulose nitrate film be sent by post, carried on public transport, or disposed as refuse.

Diacetate, triacetate and polyethylene terephthalate films provide a more stable and safe film base. They meet the requirements of international standards on the safety of cine film.

Shellac melts when heated and gives off a pleasant scent. It burns with a shining flame.

Magnetic tape is practically non-combustible. To ignite the polymer materials, of which magnetic tape is composed, the tape has to be exposed to a much higher percentage of oxygen than is found in atmospheric air.

Polycarbonate is inflammable. Manufacturers of magnetic and optical discs have certified the upper temperature limit for discs at +65° Celsius. At higher temperatures the physical properties of the discs, the magnetic layer, and the casing change. Magnetic and optical discs catch fire at temperatures in excess of 500° Celsius; the flame goes out as soon as the ignition source is removed. Therefore they are not dangerous as a fire transfer medium. However, a 100% loss of information takes place in case of fire in a magnetic disc storage room due to the heat damage to the disc.

PVC (Polyvinylchloride), vinyl, burns with a yellow, intensively sooting flame and goes out quickly without further external ignition source. PVC is hardly inflammable due to its high chloride content, contrary to other technical plastics such as polyethylene or polypropylene. However, PVC on fire creates hydrogen chloride, dioxin, and other products.

3.3.1.2. Climatic characteristics on fire safety

Hot climates tend to have larger and more diverse populations of rodents and insects that can infest AV archives. Rodents can be particularly destructive to electrical wiring by damaging the insulation, thus causing a short circuit that may create a fire. Termites or other insects that undermine the structural elements of a building may weaken the interior supports; in case of fire the flames could spread quickly, causing parts of the building to collapse, thereby allowing the fire to spread throughout the building.

3.3.1.3. Fire prevention and protection measures

The storage area has to be separated by firewalls into fire zones. If there are no windows, exhaust ducts for the smoke removal should be provided by remotely controlled valves. The emergency smoke-evacuation ducts should have a cross sectional area not less than 0.2% of the floor space of the room affected. The ducts should be fire-resistant for at least one hour. Smoke evacuation systems must keep smoke out of stairwells/stairways/staircases and remove smoke from corridors used for the evacuation of personnel. Fire doors will prevent the spread of fire, smoke and heat from one level to another. Architects should be aware of the requirements for fire exits for staff, users, and visitors from the various areas of the premises, and sufficient evacuation routes.

Consideration should be given to the proper selection of interior finishes and furnishings, flammable wall and ceiling finishes should be avoided. Floors and walls should be made of non-combustible material, and they should be constructed using fire-resistant techniques.

3.3.1.4. Requirements for electrical equipment

The electrical wiring running through an AV archives building must be airtight. Wiring should be grounded and protected from short-circuits by means of fuses. Lighting should be limited to vapour-proof or explosion-proof lamps controlled by a 2-pole switch equipped with a pilot light outside the storage room. Light fixtures should be placed at least 0.5 m from storage material. Emergency lighting should be provided with its own independent and fireproof power line.

Electrical equipment should be maintained regularly and checked routinely for malfunctions.

3.3.1.5. Requirements for storage room equipment

The primary equipment located in storage rooms is stationary and/or mobile shelving. Only metal shelves should be used, as wooden shelves create a constant fire hazard. Any additional equipment used in storage areas such as bookcases or card catalogue cabinets should also be made of metal, because any wooden or otherwise combustible material will increase the fire hazard.

3.3.1.6. Requirements for fire detection equipment

Heat and smoke detectors are absolutely a must. They require a signal transmission system to report the fire to the local fire department, to sound the local alarm, and/or to activate fire suppression systems and ventilation controls.

It is also helpful to co-operate with the local fire department. Periodic inspection tours together with the fire prevention officer will improve the fire fighters' response time and their knowledge about the chemistry of special collections, e.g., cellulose nitrate film.

3.3.1.7. Requirements for fire extinguishing systems (according to TC-05)

Ideally, the entire building housing an audio-visual collection should be separated in fire divisions of appropriate dimensions and equipped with a fire detection system. The storage area should be fireproof, and equipped with an automated fire extinguishing plant. In the 1970s and 1980s, halon gas was widely used as a fire extinguishing agent for sensitive cultural materials, replacing sprinkler systems. This was also recommended by IASA in 1981 (TC-02). Because of its effect on the depletion of the ozone layer, halon and other fluor-chlorine-carbon-hydrogenic agents were banned in the Protocol of Montreal in 1989. Today, a number of more environmentally friendly halon replacement gases (e.g., INERGEN) are available for traditional materials as well as for server rooms of digital archives, which are also recommended for audio-visual materials.

INERGEN is a mixture of nitrogen, argon, and carbon dioxide and is used as an extinguisher for fire fighting. Contrary to pure carbon dioxide, INERGEN is tolerable for human beings; provided correct calculation of the quantity, people can survive in rooms flooded with INERGEN. The gas concentration within flooded rooms is rather constant over a longer period. INERGEN is used only in stationary installations, but not in handheld extinguishers. It is stored as gas in gas cylinders; one cubic meter room requires about 2 litres of INERGEN. When welling out from its cylinder, no fog is produced which is the case with carbon dioxide.

So called "dry fog" or "water mist" systems, spraying water in a very fine dispersion into the vault, are gaining popularity, as the cooling effect is of great support for the protection of carriers, while water damage is rather minimal. In water mist systems, water is forced through micro nozzles to form a water mist with the most effective fire fighting droplet size. The water mist can give optimum protection by its cooling effect and also by the "inerting" or elimination of oxygen effect as water expands by a factor of 1700 when it evaporates. Thus when water mist comes into contact with the fire, then heat and oxygen, two of the essential ingredients of fire are much reduced or eliminated. Less water is required in water mist systems than with conventional fire sprinklers systems. Water mist systems are almost like the spray from an aerosol where conventional sprinklers are more like the water coming from a domestic shower. Such systems can be used for all kinds of archives. They are unsuitable, however, for electrical installations such as digital repositories (e.g., servers).

Hand-held fire extinguishers should contain CO₂. Water, foam, and powder, the most popular agents used in office-type extinguishers, must not be used. Although these are chemically harmless, the removal of the fine dust from powder extinguishers from contaminated audio-visual carriers is extremely time consuming and sometimes not sufficiently achievable.

3.3.1.8. Fire protection plan

Every AV archive should have a fire protection plan that covers the need to:

- Remove potential causes of fire.
- Create conditions that impede the spread of fire.
- Ensure the safety of staff, users, and visitors.
- Set up a fire evacuation plan for particularly valuable AV material.
- Install fire-extinguishing devices that cause minimum damage to AV material while ensuring that the fire is extinguished with minimum losses.

It is the emergency manager's responsibility to set up an evacuation plan for staff, users, and visitors. This includes sufficient fire exits and unlocked fire doors in case of fire. Furniture blocking fire doors has to be removed instantly. Evacuation plans have to be tested in regular intervals by unannounced fire drills.

3.3.2. Water

Most disasters affecting archives involve water damage. The water can originate from a variety of sources. How does water enter an AV archive? Basically, it can come from all sides: from the ceiling, from the floor, from walls, due to burst water pipes, due to a leaking roof, due to blocked drains, from cyclone damage, as a result of ageing, of bad maintenance, or often as a result of fire extinguishing. All audio-visual materials are vulnerable to water, and the damage depends on the type of the material, the length of exposure to water, its temperature, or its pollution level. Consequently, all key personnel should be familiar with salvage methods for wet archival materials.

3.3.2.1. How does water influence AV carriers?

Water is the greatest natural enemy for all audio-visual carriers. It has direct chemical and indirect influences on the stability of carriers. Direct chemical influences are hydrolysis and oxidation of several carrier components as well as dissolution of some carrier materials. Hydrolysis (meaning dissolvable by water) is also an indirect and long-term chemical reaction involving water as the central agent, omnipresent in form of humidity in the air. Some polymers are prone to hydrolysis. Acids and metal ions act as catalysts in supporting such processes. The reaction changes the chemical and therewith the physical properties of the original polymer, often producing a by-product which acts as an auto-catalyst that enhances the destructive process. Some hydrolytic processes are (partly) reversible; some are not. A widely known hydrolytic polymer breakdown is the so-called vinegar syndrome.

3.3.2.2. Direct contact with water

Direct short contact with water is only dangerous for some kind of instantaneous discs, especially those made from gelatin or cardboard. For the majority of carriers water is not immediately dangerous, as long as the contact is short, carriers are carefully cleaned if water was dirty, and carriers are thoroughly dried in due course. The major problem with carriers exposed to water influx is the logistical challenge of cleaning and drying the contaminated carriers, specifically of magnetic tape cassettes. Another logistic problem is the separation of carriers from paper and cardboard materials, such as LP albums, tape boxes, and other paper-based containers, and the drying of those, before they become affected by mold and fungus. If greater quantities are affected, vacuum freeze drying, successfully developed for the rescue of paper and book materials, may be the only chance to safeguard paper and cardboard materials accompanying audio-visual material. The applicability on audio-visual carriers themselves, specifically on magnetic tape, has, as yet, not been sufficiently investigated.

Oxidation is another chemical reaction triggered by water. It is a potential threat to non-oxidic pure metal particle magnetic pigments, as used for compact cassettes IEC IV, for R-DAT and

for most digital video formats. Oxidation also affects the reflective metal layers of optical discs, in particular aluminium and silver; except those having a reflective metal layer of gold. The polycarbonate substrate itself is water-resistant.

The following picture illustrates a water intrush that happened in the 1990s in the radio sound archives of my company on a Friday night at about 10pm. There had been a thunderstorm with an unusually heavy rainfall for several hours that resulted in rainwater seeping into a gap between the building's wall and an adjacent building. Fortunately, a staff member was on duty until midnight, and he succeeded in constructing several overflow tanks. Nevertheless, we had thousands of wet tape boxes that had to be removed and exchanged.



3.3.2.3. The indirect influence of water

The indirect influence of water relates to bio-degradation, specifically mold (fungus growth), which happens at prolonged exposure to relative humidities (RH) of 70% and higher, which may happen when drying actions after direct water contact are delayed. Fungi of various kinds are present everywhere in the world. They affect nearly all audio-visual carriers. Fungi "eat" the surface of analogue discs, which leads to excessive surface noise, specifically with wax cylinders. They grow on magnetic tape pigment layers, which renders replay difficult to impossible. Fungi are also known to affect CDs, rendering them unplayable. Chemical prevention of fungus must be seen critically, as unfavourable chemical interaction, specifically with the variety of magnetic pigment binder formulation, can never be safely excluded. Chemical treatment may also endanger the health of archive staff.

Because of its potential to directly and indirectly influence carriers unfavourably, fungus growth must be prevented by keeping relative humidity low. Any direct contact with water, where in principle permissible, must be kept as short as possible.

3.3.3. Further impacts

3.3.3.1. Earthquakes

Shelving may collapse and the contents may be thrown to the floor. Few AV materials can withstand such treatment. Fire and water damage often result from seismic activities.

The following photograph illustrate a disaster in the radio sound archive of my company when a young man tried to shift a stationary shelf loaded with approximately one thousand tape boxes. The effect was that the shelf did not move but toppled, dragging along all the following shelves like dominos. The impact of an earthquake could look like these.



3.3.3.2. Biological agents

Materials may be eaten, soiled, stained, and shredded. In humid and hot zones the risk of collection losses due to biological infestation is by far greater than those posed by chemical aging or mechanical damage.

3.3.3.3. Nuclear electromagnetic pulses (NEMPs)

For audio-visual preservation, the NEMP would be the one produced by a nuclear bomb. The strength of its magnetic field would depend on various factors (force of detonation, design of the bomb, most of all altitude of explosion), possibly strong enough to erase unshielded magnetic recordings, but also indirectly hazardous by destroying electronic hardware, electric installation and construction through fires caused by high voltages induced in metal conductors and short circuits.

Although, theoretically, audio-visual archives may be considerably endangered by NEMPs, their probability is extremely minimal. Protection against a NEMP for AV equipment and magnetic carriers can be provided by encapsulating them into a Faraday cage and by using appropriate protection circuits of all power lines (galvanic separation, excess voltage diverters). Buildings and single rooms can be protected by completely coating them with metal wire netting. Generally, the higher the frequency of the electromagnetic radiation there is, the smaller the meshes of the wire netting will need to be. As the spectrum of pulses is very broad, effective shielding will require a completely sealed shielding of electrically well-conductive metal sheeting, e.g., copper, which is well grounded.

3.4. Risk categories and examples

3.4.1. Four categories

- Category 1. High probability, high effect: Fire, cyclone, flood, earthquake, dust storms, burst water main.
- Category 2. High probability, low effect: Leaking tap, poor environmental conditions, theft, vandalism.
- Category 3. Low probability, high effect: Earthquake, nuclear war, civil unrest, bush fire.
- Category 4. Low probability, low effect: Collapse of shelves, theft, vacuum cleaner malfunction.

Risks are not static; they vary as conditions change.

3.4.2. Mitigating disasters

Most disasters in Category I cannot be prevented but the effect of some can be mitigated by implementing appropriate procedures. Preparedness plans are usually the most important in coping with disasters in Category I, including:

- Insuring collections
- Creating and periodically updating contingency plans
- Assembling emergency supplies
- Allocating salvage priorities
- Identifying alternative storage sites
- Providing adequate fire protection
- Providing opportunities for staff to be aware of what is expected of them in the event of disaster.

The most common and repeated risks in Category I are water and fire related damages. The most feared is fire, representing the risk of total loss. Water extinguishes fire but also presents rapid destructive sequels such as massive fungus attacks or swollen supports. Most wet archival material is salvageable, so comprehensive preparedness plans for coping with water are essential.

The aim of a disaster plan is to minimize risks and to move as many as possible into Category 4.

4. The disaster plan

4.1. Basics

A disaster plan is a document with several sections that describe the procedures devised to prevent and prepare for disasters and those proposed to respond to and recover from disasters when they occur. It is advisable that a disaster plan engages the highest institutional level of authority, providing for its necessary allocations in the budget.

To increase the opportunity for a successful recovery of valuable records, a well-established and thoroughly tested plan must be developed. Disaster planning is a matter of basic security for any institution, its staff, and its collections.

A formal written plan enables an institution to respond efficiently and quickly to an emergency and to minimize damage to the building and its contents, holdings, and facilities. This plan must not be overly complex but rather emphasize simplicity in order to aid in response and recovery.

Due to the unique nature of every disaster, recovery plans can never be formulated in detail.

4.2. The disaster team

The responsibility for performing these tasks is allocated to various staff members who form “the disaster team.” There are also suggestions for two or even three teams, one for prevention, one for response, and one for recovery, depending upon the size and complexity of the institution as well as the variety of its holdings.

The disaster team is headed by the disaster plan manager, along with one or more specifically identified deputies. The members of the disaster team must be selected from all relevant fields of the institution. The disaster plan manager must be given full support and all staff must know that in the event of a disaster this person and their deputy(s) speak with the full authority and responsibility of the entire institution.

The disaster team has primary responsibility and authority. Its members are responsible for the following tasks:

- To prioritize collections
- To prepare and distribute materials on alert procedures for staff orientation
- To establish and stock lockers/rooms with emergency supplies and equipment
- To train appropriate personnel in each unit
- To make sure that support staff is, in turn, trained in recovery procedures

It goes without saying that human life takes precedence when formulating the priorities of an emergency plan. A rescue plan for personnel will usually take into consideration a number of points, including:

- General emergency procedures
- Building alarms
- Evacuation instructions
- Health services for emergencies
- Power outages
- Elevator safety instructions
- Correct procedures to follow in the event of bomb threats or explosions
- Correct procedures in case of chemical spills, fire, and flood

4.3. Four phases, four plans

Every disaster passes through a temporal development characterized by three parts: Before, During, and After. Therefore, a comprehensive disaster plan consists of several independent but interrelated smaller plans in order to cope with each of these sections.

In the Before-part, which corresponds to everyday routine operations, two phases should be distinguished: a *mitigation/prevention phase* and a *preparedness phase*. For both phases different plans should be in operation.

In the During-part a response to the disaster must be made. The effectiveness of the *response phase* is governed by the thoroughness of the preparedness plan.

In the After-part, plans for a *recovery phase* are implemented.

In each of the four phases and their respective plans it is essential that consideration is given to all areas likely to be affected by the disaster. These areas are:

- Personnel including staff, users, and visitors.
- Collections, holdings, and records, including all categories of archival records, in particular sound and video recordings and their related catalogues and backup materials. It is also important to consider the protection of the institution's vital records.
- Building(s) and facilities, including equipment, vehicles, air conditioning plant, plumbing, electrical services, and computers.

The following section outlines recommended action in all four phases, but prevention is the best protection against disaster; natural or man-made.

4.3.1. Phase I: before | disaster mitigation and prevention plan (DMPP)

Any DMPP should consider three objectives—detection, awareness, and control—and should recommend actions that will prevent most disasters, that is to analyze, identify, and minimize the risks posed by the building, its equipment and fittings, and the natural hazards of the area. All preventive activities should be incorporated into the day-to-day operations of the institution. They include recommendations such as the repair of leaking roofs, the improvement of

maintenance, or the upgrading of security measures. Absence of a DMPP can translate into risk increments. Insurance companies often request copies of written plans before issuing policies, most surely in the case of digital archives.

4.3.1.1. Recommended basic actions

A) Conduct a risk analysis:

- Identify those occurrences that pose the greatest threat to the institution and its collections.
- Develop procedures to eliminate those risks or reduce their impact should they occur.

B) Identify existing preventive and preparedness procedures, if the institution already has them. Such procedures will range from security measures, storage procedures, and cleaning practices—through binding and fumigation operations up to fire safety precautions.

C) Make recommendations to implement additional preventive and preparedness procedures, mainly to prepare for high probability disasters.

D) Allocate responsibilities.

E) Devise procedures to respond to and recover from disasters.

4.3.1.2. Recommended further actions

A) Check the place of the collection in its building; neither the basement nor the attic is an optimal place.

B) Assess what emergencies have occurred in the past and their potential for recurring in the future.

C) Assess the prevailing climate, in particular assess climate changes, and whether those changes have affected, or will affect, the capacity of the premises to continue to act as a protective and safe environment for the collections. Geo-climatic changes speed up a building's breakdown, causing materials to fail before what is normally expected.

D) Changes in use of the premises can generate unexpected risks. Carry out closely and critically an inspection of the building and its location; are there material failures accumulated with age, are there original or aggravated defects, has maintenance been neglected through the years?

E) Alter factors that constitute a potential hazard.

F) Establish routine housekeeping and maintenance measures to withstand disaster in buildings and surrounding areas.

G) Install automatic fire detection and extinguishing systems, and water-sensing alarms.

H) Take special precautions during unusual periods of increased risk, such as building renovation or repair works. Welding operations should be executed only when a supervisor is present since sparks of a welding apparatus can produce fire.

I) Make special arrangements to ensure the safety of archival material when exhibited.

J) Provide security copies of vital records such as collection inventories, and store these off-site. Identify important items in the collections. Have comprehensive insurance for the archives, its contents, the cost of salvage operations, and potential replacement and restoration of damaged materials.

K) Protect IT-equipment (e.g., computers, servers, network devices, and mass stores) through provision of uninterrupted power supplies. Natural and man-made hazards such as floods and fire affect digital collections in the same way as traditional holdings. However, digital collections are extremely susceptible to the world of technical risks such as hackers, viruses, worms, and Trojan horses with fraudulent intention. Also, mistakes by staff or misuse by users or visitors are hazardous. Backups must be made and security copies must be stored at different sites to safeguard data on IT-equipment before a disaster strikes. A lack of standards and the update or change of a platform may result in inaccessible data. Inadequate maintenance of hardware as well as software will cause data loss. Regular “data refreshment” will prevent irretrievable data loss.

4.3.2. Phase 2: before | preparedness plan (PP)

4.3.2.1. Recommended actions

A Preparedness Plan (PP) is designed to ensure that identified disasters can be managed. PPs recommend the following types of actions.

A) Determine, acquire, and keep together supplies and equipment required in a disaster and maintain them. Supplies could include:

- Plastic sheeting
- The provision of freezing facilities
- Plastic garbage pails
- Large sponges
- Pails and buckets
- Flashlight with extra batteries
- Protective clothing (plastic aprons, gloves, boots, etc.)
- Blotters to absorb standing water
- Inventorying materials (paper, notebooks, soft pencils, waterproof felt tip pens, colored pressure sensitive tape)
- Scissors, knives
- Duct/boxing tape, first aid kit
- Further: wet-or-dry vacuums, large fans to circulate the air; water-proof tape to seal leaks in pipes, battery-operated emergency lighting, emergency air support systems, zip-lock bags, plastic bubble wrap, a large quantity of absorbent paper towels.

Such supplies are useless if they are not readily available at all times of the day or night. Supply lockers and rooms with emergency equipment must remain unlocked at all times and be checked regularly and replenished as needed.

B) Regularly train staff to enable them to respond to a variety of disasters.

C) Establish and train an in-house response team and provide them with training in disaster response techniques.

D) Prepare and keep an up-to-date set of floor plans (blueprints) of the building(s). Identify and mark on these floor plans the locations of irreplaceable and important material for priority salvage. Also mark these blueprints with such information as:

- Previous problems (leaks, chemical problems, etc.)
- Place of the alarm boxes

- Location of emergency supplies
- In the event of the failure of lighting: what is the physical arrangement of the area so that personnel can move around with some confidence (where are the aisles, if using compact shelving, where are the controls to shift the stacks, etc.)
- Building floor-plans with locations of cut-off switches and valves
- Location of the sprinkler and other water shut-off valves; who has the keys to access them and authority to shut them off
- Place of the electrical switches, the master electrical boxes and shut-offs
- Place of hand-held fire extinguishers
- Escape routes

Distribute these blueprints to appropriate locations on- and off-site. They should be located in multiple, readily accessible places, not just locked in the director's office. Some of the areas where they should be placed are in the security office (if there is one), with the local fire department, and at the home of key staff members.

E) Keep an up-to-date inventory of all holdings.

F) Create a list of names, addresses and home telephone numbers of personnel with emergency responsibilities.

G) Create a list of names, addresses and home telephone numbers of the in-house disaster response team.

H) Create a list of names, addresses and home telephone numbers of trained conservators with experience in salvaging water-damaged materials, resource organizations, and other facilities able to offer support in the event of a disaster.

I) Create a list of disaster control services, in-house supplies, and equipment.

J) Create a list of suppliers of services and sources of additional equipment and supplies, including names of contacts and home telephone numbers.

K) Make arrangements to access freezing facilities if needed.

L) Make arrangements for funding emergency needs if needed.

M) Make copies of insurance policies.

N.) Prioritize collections to determine what is to be salvaged first. Most of us do not realize fully that time is a premium when an emergency takes place. Staff must be made aware of this decision and must be properly trained in how to evaluate the situation to determine if there is time to salvage even the most valued items in the collection. The staff should be trained to know how to handle those items.

O) Institute procedures to notify appropriate people of the disaster and assemble them rapidly. Install contacts to all relevant external security units, e.g., the fire department or civil defence bodies, by way of an invitation to participate in a workshop, seminar, or inspection routine to introduce the institution, its mission, its personnel, its holdings and collections, and its installations.

Preparedness must include an established communication system—a telephone tree, for example, with appropriate 24-hour contacts for the local fire department, the security office, engineers, and the staff of each unit. This information should be clearly posted for all to see and should be part of the at-home requirements of those in areas of responsibility and authority, and should have clearly designated alternates in the event someone cannot be reached.

4.3.3. Phase 3: during | response plan

When disaster strikes, a response to it must be made.

4.3.3.1. Recommended actions

- A) Follow established emergency procedures for raising the alarm, evacuating personnel, and making the disaster site safe.
- B) Contact the leader of the disaster response team to direct and brief the trained salvage personnel.
- C) When permission is given to re-enter the site, make a preliminary assessment of the extent of the damage and the equipment, supplies, and services required.
- D) Stabilize the environment to prevent the growth of mold.
- E) Photograph damaged materials for insurance claim purposes.
- F) Set up an area for recording and packing material that requires freezing, and an area for air-drying slightly wet material and other minor treatment.
- G) Transport water-damaged items to the nearest available freezing facility. There is a maximum of 48 hours before hazards such as mold growth would begin. Even before that, binders will break down and paper will dissolve; ink on labels will run or be washed off; the building structure can be severely damaged; electrical circuits can be overloaded; and short-circuits can result in electrical fires.

4.3.4. Phase 4: after | recovery plan

4.3.4.1. Recommended actions

- A) Establish a program to restore both the disaster site and the damaged materials to a stable and usable condition.
- B) Determine priorities for restoration work and seek the advice of a conservator as to the best methods and options and obtain cost estimates.
- C) Develop a phased conservation programme where large quantities of material are involved.
- D) Discard items not worth retaining and replace items not justifying special conservation treatment.
- E) Contact insurers.
- F) Clean and rehabilitate the disaster site.
- G) Analyze the disaster and improve the plan in the light of experience.

5. How to avoid failures

Emergency preparedness must be viewed as an ongoing process, consciously and methodically cultivated so that it becomes ingrained into the very fabric of the institution; it must be a collective endeavour. A disaster plan must necessarily involve personnel from all functions and disciplines. It must concern itself not only with storage and preservation specialists, but also with engineers, technicians, senior administration, management, and the full range of service groups of the institution. It is important to revise the disaster plan frequently on a regular scheduled basis and to ensure that every staff member is familiar with its contents. One of the

best methods of maintaining staff awareness is to practice the plan regularly. The key element in avoiding failure is for all staff, especially for senior staff, to remain committed to the plan.

6. Conclusion

Natural adversities or man-made disasters can take place day and night.

Be prepared for any type of disaster. Contact and consult both archives and archive associations to share information and experience with a view to regional co-operation.

Take advantage of educational sessions, particularly disaster planning workshops and preparedness exercises.

Seek expert advice and help from the preservation offices of national and international disaster management institutions.

Far more crucial than hours invested in restoration of AV carriers is the identification of liabilities and responsibilities and the eradication of hazards such as bad habits among staff, environmental laxness, inadequate shelving, missing safety devices, or non-compliance of safety measures, to name but a few.

Prevention is always better than the cure—concentration on efforts for prevention is absolutely recommended.

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MAGNETIC TAPE STABILITY: TALKING TO EXPERTS OF FORMER TAPE MANUFACTURES

Dietrich Schüller (Vienna, Austria)

In memoriam Werner Singhoff

Paper presented at the IASA Technical Committee (TC) Open Session in Delhi, India, 2012.¹²

1. Introduction

Unlike film, whose instability has kept film archivists on alert since its invention, the stability of magnetic tape has only become the subject of systematic investigation in more recent years. Because of the critical instability of nitrate cellulose, film conservation and archiving has always been in the hands of chemists, while electronic engineers dominated the archiving of sound and, later, videotapes. The engineers, generally, did not worry greatly about the stability of the base materials of tapes until problems became apparent. Therefore, apart from the early and authoritative study by Picket and Lemcoe in 1959, it was not until the 1980s that tape stability became the subject of concern. By that time, modern audio and videotapes had started to get sticky: a phenomenon that soon became known as “Sticky Tape Syndrome,” later termed “Sticky Shed Syndrome” (SSS).¹³

This phenomenon triggered a series of publications written by concerned users and archivists. They felt responsible for the survival of the recorded content, whether for commercial reasons or because they felt a moral obligation as representatives of memory institutions. This does not mean that tape manufacturers were not involved in actions to rescue affected tapes. They worked in close and discrete cooperation with the holders of such tapes whenever major problems were discovered. Obviously, commercial considerations prevented an open scientific dialogue between tape manufacturers and archivists unlike that established between film manufacturers and film conservators.

Research into magnetic tape stability and life expectancy culminated in the 1990s and was one of the key topics of the Joint Technical Symposia.¹⁴ It faded to some degree, however, after 2000 when the urgent need to transfer audio and video content into digital repositories was recognized. This was because of the ever-growing threat of the loss of replay equipment in operable condition because of the withdrawal of manufacturers from the field and the unavailability of spare parts. Still, a deeper understanding of tape deterioration remained important in order to arrive at a solid basis for reconditioning problematic tapes for optimal replay.

Consequently, magnetic tape stability, deterioration, and recovery were part of project KUR-ILKAR of the Department of Ethnomusicology at the Ethnological Museum in Berlin—more colloquially known as the “Berlin Phonogramm-Archiv.” This project was jointly carried out with the Rathgen Research Laboratory.¹⁵

¹² Updated version of a paper originally presented at ARSC 2012, Rochester, USA, May 2012.

¹³ The phenomenon of SSS is very well known. Tape layers stick together to a greater or lesser extent, tapes squeal during replay, back coating may stick on the pigment side and sticky tape components are deposited on the tape guides and heads. This prevents the intimate tape-to-head contact obstructing the replay of the high frequencies of audio and causing severe replay problems, if not complete breakdown, of video signals. Before these interviews explained additional reasons, the hydrolysis of pigment binder was the generally assumed reason for SSS. Gilmour and Fumic (1992) is a representative article of that time, while Kevin Bradley (1992) expresses early skepticism. For more references see IASA-TC 05.

¹⁴ Specifically, the Joint Technical Symposia from 1990-2000.

¹⁵ The KUR-ILKAR-project was a conservation programme and had two main objectives: Conservation of the unique holdings of copper negatives of the cylinder collection of the archive, and stabilizing and reconditioning of the archive's tape collection.

The author was consultant in this project and his major engagement was focused on establishing contacts with experts of the former tape manufacturers BASF and Agfa.

Parallel to development of the “Magnetophon” by AEG in the 1930s, the chemical company IG Farben had developed magnetic tape and was the only producer until the end of World War II. Thereafter, magnetic tape production in West Germany was continued by two offsprings of IG Farben, BASF and Agfa, who were in competition with each other.¹⁶ In 1990 BASF took over Agfa Magnetics, maintaining both companies’ production plants: Willstätt (originally BASF) and Munich (originally Agfa). In 1997 BASF Magnetics was sold to an investor and renamed EMTEC. In 2004, however, EMTEC stopped the production of magnetic tape.

In this post-commercial, post-competitive situation it was possible to contact former experts from BASF and Agfa and to ask them for interviews about magnetic tape stability, centred on the Sticky Shed Syndrome. Interviews were arranged with experts formerly working with Agfa and BASF before the takeover in 1990.

The first interview took place on 13 May 2011 in Munich with experts from the former Agfa plant: Werner Singhoff and Rudolf Müller, who were engaged in professional customer service; and Klaus Koepe, who specialised in tape testing and tape recovery. Their experience predominantly concentrates on professional audiotapes. Wulf Münzner, formerly working at BASF on videotape development, was interviewed on 6 and 7 October 2011 in Berlin.¹⁷ The interviewing team consisted of Elena Gómez Sánchez, chemist; Simon Kunz, conservator; Katrin Abromeit, conservator (in Berlin only), all from Rathgen Research Laboratory; and the author.

A list of questions had been sent to the interviewees in advance. The interviews (Munich four hours, Berlin six hours) have been logged in German. The interviewees partly amended the minutes with additional information before giving their final approval. Abstracts of these interviews, again authorised by the interviewees, have been published in the ILKAR Project Documentation DVD. This DVD also contains the minutes, a close-to-verbatim transcript, of the Munich interview. The minutes of the Berlin interview has not (yet) been published.

A discussion of the interviews in light of previous publications is not the aim of this article. The intention is to point to the abstracts of the interviews, briefly summarise their essence, and to draw some personal conclusions therefrom.

2. The essence of the interviews

2.1. Sticky Shed Syndrome (SSS)

Sticky Shed Syndrome, the causes and treatment of affected tape, was the central interest of the discussions.

The Agfa team mentioned hydrolysis of pigment binder in association with too high pigment concentration (PEM 469) as the main reason. Tape surface damage, caused by mistreated tapes and ill-serviced machines, enhanced the problem as damages act as a “port of entry” for deter-

16 A third offspring was Agfa Wolfen, later ORWO, in Eastern Germany. Their cellulose acetate based professional tapes, specifically “Agfa Wolfen C,” were popular with broadcasters in the entire former Eastern Bloc, from Eastern Germany to Vietnam.

17 In the late 1980s and early 1990s, Werner Singhoff and Rudolf Müller were frequent participants in the discussion groups of manufacturers and archivists arranged at the fringe of AES conventions in the US by William D. Storm and Gerald Gibson, which led to the establishment of the AES Standard Sub-Committee on Audio Restoration and Preservation (AES SC 03). The contacts with Dr. Wulf Münzner were kindly established by Friedrich Engel. The author is indebted to the experts for their enthusiasm in supporting magnetic tape preservation studies, and for their generous, time-consuming engagement before, during, and after the interviews. Sadly, Werner Singhoff unexpectedly passed away in May 2012. His presence will be missed in future studies on magnetic tapes and the details of their production.

rioration. Lubricant exudation was reported as a second reason for SSS, particularly common around 1988 with PEM 468 tapes as a result of a change in recipe.

At BASF, hydrolysis of pigment binder was never experienced. However, the following other reasons were reported:

- Primer exudation—at BASF, a PVC-based 0.1 µm layer on the base film, to facilitate cohesion between base film, pigment, and back coating.
- Superfluous dispersion agents.
- Lubricant exudation, often as a result of temperatures below 5-6°C.
- Insufficiently cross-linked binder components, only occurring in consumer video tapes produced at high speed.

An exclusive relation between SSS and back coatings, as reported by some American authors, was not confirmed from either group.

Agfa treated affected audio tapes, suffering from hydrolysis as well as lubricant exudation, by mechanical cleaning with lint free tissues and temperature treatment at 60°C. BASF offered mechanical cleaning by agate blades and temperature treatment at 40°C, in order to avoid geometrical tape distortion of video tapes. Both confirmed that temperature treated tapes were playable only for a limited period and returned to sticky conditions. As the transfer of content was the objective of treatment, the further behaviour of temperature treated tapes was not observed.

2.2. The role of the production process for tape quality and stability

The other topic discussed in both interviews was the important, if not predominant, role of the production process for the quality and stability of magnetic tape. The production speed of professional tapes was between 100 and 200 m/min. Great precision was required to achieve the optimum chronological sequence (in terms of seconds) in the application of chemical and physical processes:

- Application of the primer (BASF)—at Agfa, the base film was delivered with primer already added.
- Coating of pigment/binder layer.
- Pre-orientation of magnetic particles by a magnetic field—binder must still be soft enough to allow this.
- Calendering—the use of heated rollers to shape the surface of the pigment layer. The pressure and temperature of the calender rollers determine surface evenness and hardness, as well as the size of pores for lubricant delivery. The binder must have sufficiently hardened before this process can be undertaken.

In the last period of tape manufacture, the production speed reached 1000 m/min. This required cross-linking of binder components during the coating process. Uneven distribution of binder components, however, led occasionally to sticky areas. This kind of SSS cannot be cured, either by mechanical, or by temperature treatment. The high-speed process, however, was only used for the production of video consumer tapes.

It was also stated in both interviews that the development of new magnetic coatings was an expensive and time-consuming process, which could last up to two years. Consequently, the tendency was to keep production stable over long periods. Corrections or alteration were exceptions.

The unanimous statement of Agfa and BASF experts is that the chemical recipe is the basis, but not the guarantee, for tape quality and stability. The production process is equally, if not more, essential and consequently it is a highly protected industrial secret: competitors were never admitted into production plants.

Another production-related phenomenon was observed when storing great lengths of tapes (e.g., 10,000 m) on one roll before slitting. This caused high pressure on surfaces of inner layers, changing their properties when compared with the outer layers.

Noteworthy is the BASF experience that problems occurred, at the latest, within two to three years after production.

2.3. Lubricants and re-lubrication

Fatty esters, fatty acids, fatty acid salts and amides were used in many combinations to determine the point of solidification of the lubricants, commonly chosen at a temperature of 5–6°C. On modern tapes, the loss of lubricant has not been observed. However, insufficient lubricant delivery because of too small pores resulting from too high calender pressure has been found. Re-lubrication is unanimously discouraged: this would always lead to excessive amounts of lubricants which would contaminate replay equipment as well as other tapes replayed on the machine.

2.4. Summary

The interviews underline the important role of the production process. This also explains what has been found empirically before: SSS replay problems do not necessarily concern all tapes of the same types; they are often related to production batches or periods. Convincing evidence has also been provided that performance differences may even occur within the same reel. Therefore, lists of endangered tape types rarely provide solid help.

The interviews have also demonstrated that tape manufacturers have developed their own procedures and traditions. The results of studies of and experiences with one type of tape cannot be extrapolated uncritically to other magnetic tapes, and particularly not to tapes of other manufacturers.

3. Personal questions and conclusions

Apart from mere scientific interest, one of the main reasons for chemical analysis of magnetic tapes was the intention to establish a hierarchy of urgency for digitisation. Analytical methods should reveal which tapes are closer to deterioration and therefore in need of immediate transfer, while others are less endangered and may wait.¹⁸ The logic of this strategy, however, was overthrown by the ever-accelerating lack of tape replay equipment and spare parts of all types. Until recently, the remaining time was considered to be 10–15 years, but from the perspective of 2013 this may already seem overoptimistic. Furthermore, following the emphasis given to the importance of the production process in both interviews, chemical analysis alone may provide an incomplete picture, as production related problems would not necessarily be fully revealed.

In light of the BASF experience that problems caused by lubricant, primer, and dispersion agents arise fairly soon after production, we should examine more closely SSS caused by binder hydrolysis and its development over time. This phenomenon was described from the early 1980s onward and it seems that it also appeared fairly soon after production of the affected tapes. Have we ever observed that tapes were in good condition after production for several years, before they became sticky, despite being stored in good conditions? Archives that have inspected their tapes in regular intervals over the past thirty years are challenged to look into their records.¹⁹

18 In the 1990s, the author had also started a research project in cooperation with the Austrian Plastics Institute aiming at prioritizing digitization according to the individual levels of instability progression. The project was interrupted because of funding problems and, due to the changed situation after 2000, it was not taken up again. Cf. Hinterhofer et al. (2000).

19 A quick request to IASA TC members for information about SSS did not lead to conclusive reports.

Whatever closer studies of the development of binder hydrolysis may reveal, chemical analysis will remain of interest, as a deeper understanding of tape deterioration may lead to improved and more sustainable reconditioning of problematic tapes for optimal replay. As the time window left for replay is obviously shrinking, the pragmatic conclusion is that **all** magnetic tapes should be considered equally endangered: their transfer into digital repositories cannot wait any longer.

Apart from the results discussed here, the interviews have disclosed a number of details that provide a fairly realistic view on magnetic tape production. Specifically, American colleagues are encouraged to seek similar cooperation with experts from former tape manufacturers in North America.

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20 The DVD can be obtained from Albrecht Wiedmann, Ethnologisches Museum, Staatliche Museen zu Berlin (a.wiedmann@smb.spk-berlin.de).

AN UPDATE ON AS-07: MXF APPLICATION SPECIFICATION FOR MOVING IMAGE ARCHIVING AND PRESERVATION

Carl Fleischhauer (Library of Congress, Washington, DC, USA)

This article is based on a talk presented at the IASA-BAAC Conference October 9, 2013. All cited URLs were consulted during October 2013.

1. FADGI and reformatting

The Federal Agencies Digitization Guidelines Initiative (FADGI) is an inter-agency activity led by the Library of Congress with membership from eighteen U.S. federal government agencies.²¹ FADGI includes two working groups. The Still Image Working Group develops guidelines and tools that pertain to the scanning of materials that can be reproduced as still images (often with accompanying texts), e.g., books, photos, manuscripts, and maps. The Audio-Visual Working Group develops guidelines and tools that support the digitization of sound recordings, video, and motion picture film.

This article describes an activity of the FADGI Audio-Visual Working Group: the development of an MXF digital format *Application Specification*²² dubbed AS-07. The Material eXchange Format (MXF) is a container format (aka *wrapper*) for digital moving image and audio media, standardized by the Society of Motion Picture and Television Engineers (SMPTE). The AS-07 profile will specify a constrained version of MXF, intended to serve as the wrapper for a preservation target format, i.e., the digital format that you digitize or transcode “to” when producing a master file for an archive. Although picture encodings—the other main part of the target format—are not our main thrust, they are referenced in the specification and discussed in this article.

AS-07 and other MXF implementations are essence containers: *files* in the classic sense. Most specialists, however, do not consider MXF files to be members of the more encompassing class called *bundles* or *packages*. As an example, this issue of the *IASA Journal* includes an article about a new and promising bundling format: AXF. BagIt is another familiar bundle or package format, as are less elaborate structures like zip, tar, and even LTFS.²³

Several FADGI member agencies have ongoing programs to digitize their collections. Significant video collections are held by the Library of Congress,²⁴ the National Archives and Records Administration,²⁵ the National Aeronautical and Space Administration,²⁶ and the Smithsonian Institution (including for example the National Anthropological Archives and Human Studies Film Archives).²⁷ The agencies’ reformatting efforts are motivated by a desire to provide access and to preserve the underlying content for the long term.

Today, different agencies employ different specifications for their preservation target formats for video. However, there is a strong interest in identifying a common format that will permit the agencies to create identical or at least very similar digital master files. Some agencies reformat in-house, where a specification can guide the purchase of digitizing systems. Other agencies outsource reformatting and a specification will help clarify the contracting process for both agencies and vendors. The AS-07 project is intended to specify a digital target format that would meet the agencies’ collective requirements.

21 See <http://www.digitizationguidelines.gov/>.

22 MXF Application Specifications are profiles, i.e., constrained implementations, of the broad MXF standard. This topic is discussed in more detail later in this paper.

23 See <http://tools.ietf.org/html/draft-kunze-bagit-09>; <http://www.digitalpreservation.gov/formats/fdd/fdd000354.shtml> (zip); [http://en.wikipedia.org/wiki/Tar_\(computing\)](http://en.wikipedia.org/wiki/Tar_(computing)); and http://www.trustto.com/LTFS_Format_To_Print.pdf.

24 See <http://www.loc.gov/rr/mopac/findaid/mpfind.html>.

25 See <http://www.archives.gov/research/formats/film-sound-video.html>.

26 See <http://www.nasa.gov/multimedia/index.html>.

27 See http://www.nmnh.si.edu/naa/guide/film_intro.htm.

2. Born digital video

Although issues associated with reformatting older videotapes launched our MXF specification effort and have been the central focus to date, we want AS-07 to be an extensible format. Other classes of moving image material—for example, born digital video and (in the future) motion picture film—are also important candidates for preservation treatment. U.S. federal archives are experiencing an influx of born digital video—both file-based and media-dependent—that represents a real and growing problem in terms of preservation. More digital footage is being shot every year. Oral history projects have largely moved to video. In one scientific agency, marine scientists are shooting extensive research footage of the ocean floor, undersea animals, and other subjects. Meanwhile, the technical formats for born digital video often vary from camera to camera and present archivists with one of today's most volatile format categories.

We believe that AS-07 will be useful as a container for some types of born digital video. Some file-based encodings might be candidates for “rewrapping” into MXF, while others may require transcoding as well as rewrapping. Meanwhile, media dependent video encodings may require extraction and/or transformation before wrapping, in which case many archives may treat this content in the same manner as that carried on older types of videotape.

Some features of the AS-07 specification that support reformatted content will also serve rewrapped and/or transcoded video. But MXF can only wrap the limited set of encodings that SMPTE has already mapped or that will be mapped as the SMPTE effort continues. At this writing, the list of completed mappings includes various MPEG and DV types, as well as VC-1 (Microsoft's Windows video), VC-2 (BBC's Dirac format), and a few others. Refining the AS-07 specification to cover these types will require a bit more development from our team and thus lies in the future.

3. What got us started?

How did our involvement in all of this begin? A few years ago, three federal agencies—the Library of Congress in their new Packard Campus facility in Culpeper, Virginia; the Smithsonian Institution Archives on the National Mall in Washington DC; and the US National Archives in College Park, Maryland—started using the same reformatting system: SAMMA. The same system is also in use by two national libraries well represented in IASA: Australia and Norway.

SAMMA stands for System for the Automated Migration of Media Archives, developed by Jim Lindner and his Media Matters company, and now manufactured and marketed by Front Porch Digital. One valuable SAMMA feature is the robotic movement of cassettes, which supports impressively high rates of throughput but has nothing to do with digital formats in and of itself.

The formatting of SAMMA's digital output can vary by implementation. Described at a high level, the Library of Congress specification calls for an MXF file that wraps losslessly compressed JPEG 2000 picture data and uncompressed linear pulse code modulated (LPCM) audio. The Library has produced well over 30,000 files since it began using SAMMA in 2007. The source videotapes for virtually all of these files have carried NTSC interlaced video. Meanwhile, other vendors have offered or plan to offer systems that produce files in the same or very similar formats. Examples include OpenCube, from Belgium, and Amberfin, from the UK.

The FADGI exploration of this topic began in 2009 and the group disseminated a background paper in October 2010.²⁸ As noted above, our examination of born digital content has been limited to date. Our main current concern is the reformatting of older videotapes and—for this class of content—the main picture encoding preferences in our group are for lossless JPEG 2000 or uncompressed.

28 See http://www.digitizationguidelines.gov/guidelines/FADGI-AV_AppSpecProj_Bkgd_101007.pdf.

4. What have we seen?

The archives that are making the most active use of MXF remain convinced that this standardized, professional wrapper is the best option for their preservation work. There are adopters of the generalized approach beyond the organizations named above, including Libraries and Archives Canada and the British Broadcasting Corporation (BBC).²⁹ In the mix of users, those who have selected lossless JPEG 2000 encoding have been pleased to see the consistent production of files with size reductions on the order of 2:1 (or a little better) as compared to files with uncompressed picture essences of the same bit depth.

Nevertheless, some issues have emerged during the first years of activity. Files produced by different systems have not always interoperated, i.e., a file made on system A may not play properly on system B, and vice versa. Problems with interoperability were most evident when JPEG 2000 picture encoding was applied to interlaced picture. Our FADGI analysis indicated that the vendors' formats were "different-but-legal" in terms of the standards, which allow for variation. In addition, methods for file validation and compliance checking have not been well established or widely adopted. We also saw that there were some elements in the source content that were not retained or imperfectly retained in the preservation files: legacy timecodes, captions and subtitles, and supplementary metadata. We want to produce complete and authentic copies and do not want to lose that information.

5. What are the relevant standards?

The general approach described here—MXF files that may carry JPEG 2000 or uncompressed picture encoding—relies upon a surprising number of standards, generally falling into four families: (1) SMPTE specifications pertaining to MXF; (2) ISO/IEC standards pertaining to JPEG 2000; (3) a variety of standards (mostly from SMPTE) that govern captions, timecode, metadata, various types of ancillary data, and more; as well as (4) broadcast standards that pertain to uncompressed video. The latter family includes specifications promulgated by SMPTE and the European Broadcast Union (EBU), although the specifics for structuring uncompressed picture into the bytes that are written to file-carrying media are based in what might be called community standards.³⁰

The overarching MXF specification document "does not define either the essence container or the descriptive metadata. Instead, it defines the requirements for these components to be added as a plug-in to an MXF file."³¹ There are more than thirty additional MXF SMPTE standards, including ST 379, ST 381, ST 383, ST 384, and ST 422 that specify the placement of the essence container in the MXF wrapper and the detailed mapping of selected essences (mainly picture encodings) to the container.

What's the history of MXF? The standard is closely related to the Advanced Authoring Format (AAF), and both specifications took shape during the period 1998–2004, with many of the same companies and individuals participating. (Refinements and extensions to the MXF standard continue to the present day.) The AAF specification was developed and published by the AAF Association, since renamed the Advanced Media Workflow Association (AMWA),³² a not-for-profit trade organization that publishes industry specifications, including MXF Application Specifications. In contrast, SMPTE is an internationally recognized standards development body that abides by the ANSI and ISO due process for initiating, approving, revising, and removing standards. Thus MXF is a "capital-S" standard, while the Application Specifications estab-

29 See <http://www.bbc.co.uk/rd/publications/whitepaper241>.

30 The reference here is to bytestreams that are associated with the fourcc (four character codes) codes V210, YUYV, YUY2, and others. See <http://www.digitalpreservation.gov/formats/fdd/fdd000351.shtml> and follow the internal links to several related pages with additional information.

31 SMPTE ST 377:2011, *Material Exchange Format (MXF) — File Format Specification (Standard)*.

32 See <http://www.amwa.tv>.

lished under AMWA fall into a “lowercase-s” category. Additional information about the MXF standard and the continuing importance of AMWA is provided later in this paper.

Although all of these standards do specify the structure and coding of wrappers and essence encodings, as noted above, each of them also permits some variation. In the case of JPEG 2000, for example, the ISO/IEC standards describe a dozen or more *profiles*. Amendment 3 to the standard’s part 1 spells out the rules for seven distinct *broadcast profiles*, two of which are for lossless compression.³³

6. The special case of interlaced picture encoded as JPEG 2000

Regarding the interoperability issues for files that carry interlaced picture encoded with JPEG 2000, the governing specification is SMPTE ST 422, *Mapping JPEG 2000 Codestreams into the MXF Generic Container*, originally published in 2006. As the title of the standard suggests, this is where the ISO/IEC JPEG 2000 coding standard intersects with the MXF wrapper standard.

Although JPEG 2000 has gotten off to a slow start in still image applications, it has developed some real traction in moving image implementations. One well-known and well-supported example is digital cinema and, indeed, two digital cinema JPEG 2000 profiles (for 2K and 4K picture) were among the very first published via ISO/IEC. Digital cinema implementations are strictly for progressively scanned images. As the digital cinema specification moved forward, JPEG 2000 picture was mapped to MXF as a part of defining the Digital Cinema Package, the format that is distributed to theaters. This mapping was worked out (in the main) to support progressive scan, however, and the resulting ST 422 specification did not address interlaced picture in a careful way. Thus there was no rulebook to guide the manufacturers who developed the first MXF-oriented video reformatting systems, resulting in some of the interoperability issues we have seen. One expert in the field called this a “standards shortfall.”

This state of affairs came into focus for us as we began our development of AS-07. Fortunately, one of FADGI’s expert consultants, Oliver Morgan of the MetaGlue corporation, is active in SMPTE standards work and also acquainted with many of the key players in the field. We learned that others, notably the Hollywood-based developers of the Interoperable Master Format (IMF),³⁴ had also identified the problem with JPEG 2000 mapping to MXF. Morgan’s work with us increased his familiarity with the issue and helped motivate him to initiate a revision effort within SMPTE.

At this writing, a revised version of ST 422 has moved through most of SMPTE’s process steps and publication is anticipated by early 2014. The revision should solve the problem of interlaced picture in JPEG 2000 going forward, but some archives with MXF-JPEG 2000 files produced in years past may decide to migrate those files to the new specification over time.

7. AS-07: an MXF application specification

An MXF Application Specification (AS) is a kind of profile that pins down preferred options and reduces the variables for both the MXF wrapper and the essence encodings that it carries. An AS’s well documented constraints are intended to support greater interoperability, increase the comfort level for users, and increase both vendor competition and the creation of open source tools. In the case of AS-07, we hope that these factors will lead in turn to increased adoption and thereby increase the format’s long-term sustainability

33 See ISO/IEC 15444-1:2004/Amd 3:2010, *JPEG 2000 Core Coding Broadcast Profiles*.

34 IMF is being standardized by SMPTE; information about the format and related matters is presented at <http://www.imfforum.com/>, and a very helpful explanatory slide show is offered by a document linked to this shortened URL: <http://bit.ly/1bN2DcD> (the full URL is http://sas-origin.onstreammedia.com/origin/smpete0109/SMPTE_Standards/2012_Standards_Webcasts/2012_Standards_IMF_Chang-2012-11-27-Nov/SMPTE_IMF_Webinar_Nov2012-v2-handout.pdf).

MXF Application Specifications, as noted earlier, are not *standards* issued by a recognized standards body. In principle, they could be drafted and published by anyone. To date, however, a number of MXF Application Specifications have been developed under the auspices of the Advanced Media Workflow Association (AMWA). AMWA members represent a wide range of broadcast-industry companies and organizations including AVID, BBC, Front Porch Digital, the U.S. National Archives and Records Administration, PBS, SONY, EVS (OpenCube), Discovery Communications, the Library of Congress, the Fox television network, NBC Universal, Turner Broadcasting, MetaGlue, Audiovisual Preservation Solutions, and others. Typically, Application Specifications are accompanied by a reference implementation, including sample files and validation tools.

AMWA has published eight ASes to date, with others (including AS-07) in process.³⁵ Here's a short list, with the *application* identified. This list has been selected to show how AS-07 makes a good sibling for specifications that apply to other parts of a content life cycle.

- AS-10 for production – for end-to-end digital production workflow (forthcoming)
- AS-11 for contribution – defines the high-end version of a television program contributed by a producer to a television network (published)
- AS-03 for delivery – specifies a reduced-data version of a television program “as sent to the tower for broadcast” (published)
- AS-07 for archiving and preservation (forthcoming)

The AS-07 development team working under AMWA auspices uses an Agile Development approach and has about ten active members while a number of other interested parties follow progress at a distance. Four members of IASA's Technical Committee are part of this group: Chris Lacinak, George Blood, Jörg Houpert, and this writer. Lacinak is the president of Audiovisual Preservation Solutions, provides expert advice to FADGI, and serves as the Agile scrum master for the AS-07 effort.

8. What if I prefer some other format?

Practices for the preservation reformatting of video are in a state of flux and a clear community consensus on best practices has not yet coalesced. Today, we see a number of organizations making good use of a range of formats, including some alternate implementations of MXF and some entirely different formats. For example, the BBC has an approach not unlike AS-07 for uncompressed picture wrapped in MXF.³⁶ Others, including the Austrian Mediathek, have embraced ffv1 lossless encoding in the AVI wrapper.³⁷ The well-respected Archivemata open-source system employs ffv1 in the Matroska wrapper.³⁸ In some applications, the source material (e.g., older videotapes) does not carry legacy timecodes (which may be discontinuous), captions, or subtitles—and the preserving archives may not seek to embed specialized metadata—and thus makes a comfortable fit for less feature-rich wrappers such as Audio-Video Interleaved (.avi extension) and Quicktime (.mov extension).³⁹

Mindful of these practices, we hope that in addition to looking at AS-07 as a *specification*, other practitioners will also study the underlying issues we are addressing—to be elaborated upon in the following sections—and see how they might be addressed with other formats. We would like our findings to be instructive, even if you choose another approach.

35 See http://www.amwa.tv/projects/application_specifications.shtml.

36 Op cit., footnote 6.

37 The Austrian Mediathek adopted ffv1 and also developed the DVA open-source software system that supports its use (and other functions); see <http://www.dva-profession.mediathek.at/> and <http://www.dva-profession.mediathek.at/documentation/>.

38 See <https://www.archivemata.org/> and <https://www.archivemata.org/wiki/Video>.

39 Information about Quicktime: <http://www.digitalpreservation.gov/formats/fdd/fdd000052.shtml>. Information about AVI: <http://www.digitalpreservation.gov/formats/fdd/fdd000059.shtml>.

9. What draws people to MXF?

MXF is attractive because it is a bona fide standard from SMPTE, widely adopted in broadcasting and professional media. The format's versatile structure supports elements important to video preservation. When reformatting older videotapes, especially from broadcast-related collections, MXF can be used to produce an authentic copy that retains legacy timecode(s); captions, subtitles and other ancillary data; and multiple audio tracks. The format also permits the embedding of a wide range of metadata.

Some observers feel that MXF is too complex and not widely supported. However, what some call complex, we call *versatile*, permitting the production of authentic copies. We argue that all video formats are complex: you need a lot of elements in order to assemble and present a complete work. Meanwhile, we evangelize in order to build support for greater adoption.

10. Timecode

What are the issues regarding timecode? Source recordings may have multiple timecodes: vertical interval timecode (VITC), linear timecode (LTC), and more. Some are present on purpose, others by accident; some may have good integrity and continuity, others may be discontinuous. Any or all of these timecodes may provide forensic help for future researchers. A legacy timecode may be keyed to old documents like tape logs, may provide clues about the older source tapes that were assembled to create the video program you are now preserving, and may (as with footage of NASA space vehicle launches) represent elapsed time that can be correlated to other data streams. In many cases, this is data you do not want to lose. Meanwhile, systems that play back files will benefit from the presence of a high integrity, continuous timecode.

In response to these issues, we have drafted the following requirements. First, AS-07 files must include a freshly recorded, continuous, high integrity *Master Timecode*. (In some contexts, this is called *synthetic timecode*.) We also call for the retention of *Historical Source Timecode*, more or less the EBU term for legacy timecodes.⁴⁰ And we have proposed a method for tagging the multiple timecodes in the file that makes novel use of two SMPTE standards.⁴¹ We believe that this tagging will appeal to others and, with luck, will be more widely adopted. AS-07's handling of Historical Source Timecode is detailed in the draft specification; for this article, some explanation is provided by the sketch in figure 1.

40 The term is used in EBU R 122, *Material Exchange Format Timecode Implementation*: <http://tech.ebu.ch/docs/r/r122.pdf>.

41 ST 385:2012, *Material Exchange Format (MXF) — Mapping SDTI-CP Essence and Metadata into the MXF Generic Container*, and ST 405:2006, *For Television — Material Exchange Format (MXF) — Elements and Individual Data Items for the MXF Generic Container System Scheme 1*. The acronym SDTI-CP stands for the Serial Digital Transport Interface carriage of Content Packages.

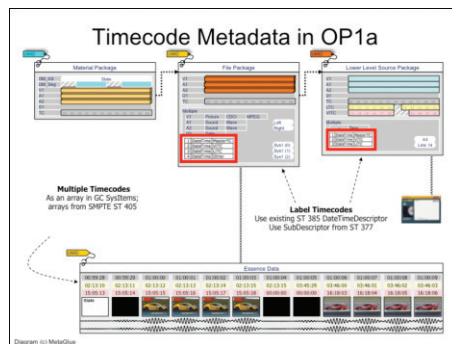


Figure 1. This diagram shows a portion of the structure of an MXF file that includes a continuous Master Timecode and discontinuous Historical Source Timecodes. Three timecodes are shown in the essence container at the bottom and also as tracks in the packages at the top. A proposed set of descriptors and subdescriptors are represented in the red boxes. The AS-07 descriptor set stitches together elements from three SMPTE standards. The terminology *OP1a* refers to MXF *Operational Pattern 1a*, the name for the commonly used file structure that carries a single unit of video content. Diagram courtesy of the MetaGlue corporation.

11. Closed captioning and subtitles

Captions and video subtitles are important features of broadcast collections although they are less frequently encountered in other classes of content. Looking back, U.S. broadcast standards have required various flavors of binary-coded closed captioning (CC), first in line 21, right at the boundary between the picture raster and the vertical interval, and then in other places in the stream. For example, there is a specification for packet-carried captions in MPEG digital broadcast streams. Other digital video streams carry CC in packets that meet a different specification. In Europe, there are some parallels, beginning with Teletext and later, EBU subtitles (STL), another binary system.

Today, broadcast authorities on both sides of the Atlantic want to set these binary approaches aside and move toward XML-based Timed Text, derived from the W3C Timed Text standard and very applicable to the Web dissemination of video. Recent Federal Communication Commission (FCC) regulations in the United States name SMPTE ST 2052-1:2010 (Timed Text Format) as a preferred option for Internet presentations.⁴² The costs and level of effort required to convert existing systems to full XML capability, however, have led to a certain level of pushback from broadcasters.

Caption and subtitle texts, once extracted and indexed, have clear value for archives, supporting search and retrieval as well as other outcomes. What should we carry in the preservation file? The binary forms will be awkward for future extraction, since this will depend on the continued availability of decoding tools and may require real-time playback. (Nevertheless, we want to retain them in their original forms in our authentic copy.) Meanwhile, easy-to-extract XML Timed Text is very desirable for archives.

42 The most recent version of the W3C recommendation is *Timed Text Markup Language 1 (TTML1) (Second Edition)*, September 24, 2013: <http://www.w3.org/TR/ttml1-dfxp/>. The FCC authority for its regulation is the Twenty-First Century Communications and Video Accessibility Act of 2010, (the "CVAA"). Although Web presentations may use varying approaches to provided accessibility, the FCC rules state that SMPTE's Timed Text format (ST 2052-1:2010) provides broadcasters with a "safe harbor" against litigation. Additional information is provided in this FCC introductory description: <http://www.fcc.gov/encyclopedia/twenty-first-century-communications-and-video-accessibility-act-0>.

SMPTE MXF and EBU standards both offer multiple options for carriage of caption and subtitle original forms and for Timed Text. We developed our AS-07 approach by consulting SMPTE and EBU standards. If present in the source recording, the original binary CC remains in line 21 in the image raster. The MPEG packets stay where they were (in that stream) while the other type of digital-stream packets are carried in what are called System Items, side by side with picture and sound essences within the file. Finally, XML Timed Text is to be carried in MXF Generic Stream Partitions (more about them in a moment). Since EBU STL, although binary, has generally been handled as a “sidecar” file, AS-07 also calls for STL to be carried in Generic Stream Partitions.

In order to meet this specification, AS07 encoding systems will have to be able to convert the binary text to XML Timed Text. We have our fingers crossed about manufacturers’ willingness to provide this capability. And like a number of the features we are specifying for AS-07, these elements will only come into practice (and manufacturers will only build systems for them) if there is genuine demand from the preservation archiving community.

12. Metadata

Our concern with metadata is not about the topic in general, i.e., the issues that every archive faces in terms of overall collection management and the provision of access to researchers. Nor are we concerned with basic information about file characteristics, the data that an application requires to play a file correctly, often referred to as *parametrics* metadata. MXF standards require a reasonable level of parametrics metadata and we simply embrace them. We did, however, draft some sections about what is called Active Format Description (AFD), a special set of codes used by broadcasters (and others) to ensure that aspect ratios, letter-boxing, pillar-boxing, and pan-and-scan are handled correctly.

Our concern for AS-07 pertains to a broad class that we call Supplementary Metadata, meaning *supplementary* in terms of MXF technical requirements. Examples include additional technical metadata, sometimes called *process metadata*, as well as information about the source item, about quality review outcomes, and preservation metadata, e.g., PREMIS. One example of process metadata is provided by the SAMMA system, which provides an XML-encoded, frame-by-frame record of the metrics associated with each tape transfer. We knew that various organizations might want to embed such metadata in their files. And beyond this technical and administrative realm, some archives (there are definite schools of thought here!) also plan to embed relatively complete descriptive (aka *cataloging*) metadata.

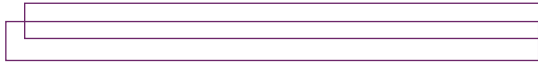
Where to carry this Supplementary Metadata? This is another entity that we propose for Generic Stream Partitions, described in the next section.

13. Generic stream partitions

MXF files are structured with partitions of several types. As the name implies, Generic Stream Partitions are designed to carry generic “streams” of various types. In effect, they are boxes into which you can put things. The standard requires each Generic Stream Partition to be accompanied by a small block of metadata that offers a minimal amount of information about what the partition carries.⁴³ As noted above, we propose using Generic Stream Partitions for Timed Text and Supplementary Metadata, two forms of text-based data.⁴⁴

43 Generic Stream Partitions are mainly governed by SMPTE ST 410:2008, *Material Exchange Format—Generic Stream Partition*.

44 SMPTE RP 2057:2011, including Am1:2013, *Text-Based Metadata Carriage in MXF*, specifies two methods for the carriage of Timed Text, one of which entails the use of Generic Stream Partitions.



Generic Stream Partitions can carry binary as well as text-based data. Some FADGI members have expressed interest in using this capability for what we call Associated Materials, e.g., scanned images of such objects as videotape box covers (which sometimes have notes written on them), stray documents that may have been in a box or are otherwise associated with a tape, publicity materials and photographs for television programs, and the like. Earlier this year, we presented ideas about the carriage of Associated Materials on the IASA list for participants in the TC-06 video preservation guideline project. This was followed by a vigorous exchange of views (many voted “no”). We see that some organizations will forbid this practice but we still wanted AS-07 to include this capability.

14. Audio tracks

This article’s listing of AS-07 features will conclude with a short note on audio tracks and tagging. Video sources to be transferred to AS-07 files may have multiple tracks, and these may represent various types of sound fields (mono, stereo, surround, and probably more), as well as things like language tracks (e.g., German and Italian narration tracks) or even sound effects tracks running in parallel with dialog tracks. Both SMPTE MXF and EBU standards provide specifications for audio track *allocation*, including recommendations for tagging the tracks. The current AS-07 draft has an interim specification based on SMPTE standards. (In contrast, the AS-11 specification, influenced by British players, uses an approach based on EBU standards.) Meanwhile, there is a separate AMWA project to refine audio allocation and tagging and, if ready in time, we plan to embrace this for AS-07.

15. Conclusion

This report indicates that the bulk of the work on AS-07 entails wrestling with the structure of the wrapper, shaping it to accommodate the complexity of the video content we want to reformat. We have done a little work on encodings, especially regarding interlaced picture as JPEG 2000 and SMPTE standard ST 422. Meanwhile, throughout the process, we have found it valuable to stay in touch with manufacturers and other professionals, and the project’s AMWA auspices have facilitated this line of communication.

FADGI’s initial 2009 video target format specification used the rubric MXF Application Specification for Archiving and Preservation (AS-AP). We began our work with AMWA in March 2012, when that organization’s board gave us general approval to proceed. This was followed in September of the same year by the approval of our project plan by the AMWA Technical Steering Committee. AS-07 team meetings began in November 2012 and we have been steadily at work ever since. We hope that our first real draft and associated sample files will be ready early in 2014, a milestone to be followed by final editing and balloting within AMWA. With luck, AMWA will publish AS-07 during 2014.

LONG-TERM ASSET STORAGE ARCHIVE AND PRESERVATION WITH AXF

Nicole Jacquemin (*Front Porch Digital, Metz-Tessy, France*)

Many media organizations today—from broadcasters to post houses to sports teams to national archives—are still working in a hybrid content workflow that relies on legacy videotape and film-based assets alongside file-based ones. Automated solutions currently exist to rationalize the economics and technical aspects of migrating these legacy assets to digital files en masse, so media organizations do have an automated way of not only preserving those assets for the long term, but making them easier to access, manage, and market. Moving legacy assets from analog to digital and operating within a completely file-based workflow is an obvious way to improve efficiency, but once the analog-to-digital migration has happened, how can an organization ensure those assets are accessible, backed up, and protected?

The answer for many media organizations is a content storage management system.

1. What is a content storage management system?

A content storage management (CSM) system is the software abstraction layer that automatically retrieves broadcast-quality content from a data tape library (with the aid of a robot) or from a data server, delivering it to a workstation, a play-out device, or to wherever else might be needed. CSM systems were developed to help content owners cope with what would otherwise be an overwhelming volume of content, to address the video-specific complexity of that content, and to prevent content loss. All of these capabilities are critical for media companies, as content is the very lifeblood of their business.

To achieve cost-effectiveness, a typical file-based workflow's storage infrastructure is usually composed of four tiers: online, the most expensive, made up of video servers and editing systems; near-line, comprising networks and disk storage arrays; archive, composed of data or optical tape libraries; and offline, usually tapes located on physical shelves. Each provides differing content access and retrieval times, but is also characterized by significantly different capital costs. Online storage is the most expensive but provides the most immediate access to content, while offline storage is the least expensive and least accessible.

CSM middleware solutions run on one or many distributed servers, providing direct integration between the so-called media network, which connects the various devices that produce or consume file-based content, and the storage network, which connects the near-line and archive storage tiers.

The CSM solution is one of the most critical elements of the workflow. Running quietly and obediently in the background, it does the fetching and carrying so that all the other systems work up to their potential.

CSM solutions are designed from the ground up to serve demanding media-centric operations and their highly active, symmetrical nature. In terms of asset backup, CSM systems can automatically replicate file-based assets, creating duplicate copies on multiple (and portable) data tape media very rapidly and without any user intervention while sharing the same management and storage infrastructure. Those copies can remain within the system to provide online resiliency or be transported to offline storage facilities for efficient and cost-effective content protection.

2. CSM vs. HSM

Some companies still think that digital media does not require any special consideration—that data is just data—and that storing video safely and effectively is as simple as choosing a data storage technology alone. For those companies, hierarchical storage management (HSM) is a common choice. HSM systems grew up in the IT world and were designed to move files between near-line spinning disk and data tapes.

So while HSM and CSM systems share the ability to move data between storage devices or media, it is our opinion that HSM systems are not optimized for managing *digital* media as CSM systems are. CSM systems are designed to cope with the special properties and requirements of digital media files as they are moved about in the workflow of a media organization. CSM can fulfill a broad set of specialized requirements beyond what HSM can do for reliable and scalable video media storage management.

Typically, CSM solutions handle an asset from online storage through near-line, archive, offline, and back again, eliminating the need for a proprietary control layer between online and near-line storage. This is one of the most important differentiators between IT-centric HSM solutions and media-centric CSM solutions, which lie at the heart of some of the most dynamic, flexible, and scalable file-based media organizations in the world.

Unlike CSM solutions, HSM solutions *age* files that have not been accessed in some time to less expensive, higher-capacity data tape media, while presenting a transparent view of the files to users regardless of where they are stored. When a user attempts to access one of these files, the HSM solution loads the applicable data tape to migrate the contents of the file back to disk storage and onward to the calling application. Perhaps the only noticeable side effect is that the file might take a little longer to open. It is also important to note that HSM systems are different than backup solutions. HSM can be seen as simple disk capacity extenders, while backup solutions ensure the ability to recover and reconstruct important data fully. This process often requires different middleware solutions to provide these functions, although occasionally the physical storage resources can be partitioned and shared between them to save capital costs.

Another distinction is that CSM systems have content awareness, which enables them to handle content as objects as opposed to simple files moving through a storage infrastructure. That is, they can group related media assets, such as a video file and associated multi-language audio tracks, as a single managed object that can be stored and retrieved as one. Media assets are typically composed of a complex collection of media and ancillary files that must be maintained carefully in order to reconstruct, access, or reuse them. This concept is usually referred to as an *object store* and is the fundamental basis of advanced CSM solutions. Rather than only maintaining a simple collection of unrelated files, paths, and folders (as in the case of HSM, a simple file system, or other technology such as LTFs), CSM solutions treat each media asset as a single unified object. The complexity surrounding the storage, recall, replication, repurposing, and transformation of these complex media objects is handled by the CSM system. Management of actual stored content, as opposed to stub files, enhances control without increasing the complexity of the storage infrastructure.

A CSM system's content awareness yields other benefits as well. Traditionally referred to as *archive software*, today's CSM solutions have evolved. Content awareness enables various media-centric features in addition to basic storage (store and restore) functionality—features such as distributed transcoding, metadata mining, file-based subjective quality analysis, timecode-based partial restore, and more—all operating in a file-based domain. Today's CSM systems also provide universal accessibility to these features via content lifecycle and policy engines, workflow tools, and open APIs for direct third-party control, integration, and collaboration.

Due to the challenges of handling large digital media content, CSM solutions typically reside in the “back office” or equipment room within the media organization. They integrate directly through high-speed networks to editing systems, playout servers, newsroom systems, etc.,

and via the aforementioned open APIs to user-facing tools such as media asset management (MAM), broadcast automation, and business systems. These CSM systems abstract the arduous work involved in dealing with valuable high-resolution assets and often permit ubiquitous and federated access through user-friendly Web-based interfaces, shortening learning curves and allowing creative people to focus on their art in a collaborative environment rather than on technical complexities.

For example, a properly implemented CSM system enables a news producer to review a comprehensive index of archival material directly from a workstation. The index includes thumbnails and browsable proxy copies of clips in addition to metadata records to assist in identifying the best shots. Once key shots are identified, the CSM solution can perform timecode-based partial restore operations on the high-resolution versions of the content and push these segments directly to the nonlinear editing environment for finishing. This not only saves time, it gives the producer access to more content, all of which potentially improves the quality of the work. Further, because this screening is done via a Web browser directly from the producer's desktop, screening rooms and editing stations are not tied up for videotape review and shot re-ingest. Once complete, the newly produced news story can be played immediately to air via traditional methods, while, in parallel, sent back to the CSM solution, which can automatically transcode it to myriad formats and deliver it to online portals (e.g., news website, iTunes, or YouTube), driving additional viewership and potentially additional revenue.

3. Storage in a CSM environment


CSM touches many aspects of the video workflow, and accessibility of the files is of utmost importance. The way the assets are stored plays a key role in the organization's ability to access the material today and in the future.

There are many storage technologies available, with a range of capacities, transfer throughput, and price to suit different operational scenarios and budgets (Figure 1).

Storage Technology Summary						
	Type	Media Capacity (GB)	Media Capacity 50Mbps (Hours)	Drive Cost	Street Price (\$/TB)	Drive Speed (MB/s)
BLU RAY	Optical	50	2	\$\$	\$600	14
HOLOGRAPHIC	Optical	300	13	\$\$\$	\$600	20
SOLID STATE (SSD, P2,...)	Flash	16-256	1 - 10	HIGH	\$2,000	~250
SAIT2	Tape	800	35	\$\$\$	\$200	45
LTO5	Tape	1500	65	\$\$	\$55	140
LTO6	Tape	2500	110	\$\$\$	\$75	160
TS1140	Tape	4000	175	\$\$\$\$	\$90	240
T10000C	Tape	5000	220	\$\$\$\$	\$70	240

Figure 1. Storage Technology Summary

No matter which storage technology is used, it should meet some important criteria for preserving today's more complex media assets—assets that require advanced storage methods related to the object store concept mentioned earlier. The proliferation of technology has resulted in a multitude of formats and systems for storing digital media, and often those formats



and systems are not compatible with one another. Here we are not talking about interoperability of the media files themselves, but rather the actual operating system, file system, storage technology, and devices used to capture, store, and protect these media assets now and into the future. This diversity and potential long-term incompatibility makes reliable and guaranteed access to these assets complicated, expensive, and sometimes impossible. Solving the problem means establishing a common format for digital media storage that works not only with any existing system, but also systems that have yet to evolve—an open standard for the long-term storage and preservation of media assets.

Although this may seem unnecessary on the surface, there are many documented cases today where important files stored on dated technology using non-standardized methods have become inaccessible and are therefore lost forever. We may be able to recreate an MPEG-2 software decoder on whatever platforms exist 100 years from now, but are we certain we will be able to find a system compatible with FAT32 to be able to recover the MPEG-2 content itself?

So, to tackle this daunting problem, the ideal storage format should:

- Ensure long-term accessibility
- Enable self-descriptive assets and self-descriptive storage media
- Have Open Archival Information System (OAIS) preservation features (e.g., fixity and provenance)
- Encapsulate files to wrap related metadata and other files
- Be scalable for any number of elements of any size and type
- Be standardized regardless of storage media technology
- Facilitate transportability and compatibility among systems

4. Some imperfect options

4.1. Tape ARchive Format (TAR)

Tape ARchive format (TAR) has been around for decades. Initially created in the early days of UNIX to write data to sequential I/O devices for tape backup purposes, TAR is now commonly used to collect many files into one larger file for distribution or archiving, while preserving file system information such as user and group permissions, dates, and directory structures. Even though it is still used heavily today, many of its design features are considered dated. For one thing, despite following established standards, there is no true universal TAR implementation. TAR is also a legacy format that does not allow intelligent functions such as partial file restore. In addition, it does not maintain an on-media catalog of stored content, it has no resiliency feature, and it has no apparent long-term preservation features as defined in the OAIS model.

4.2. Linear Tape File System (LTFS)

The Linear Tape File System (LTFS) is a simple file system for linear data tape that makes data tapes appear as “removable storage.” It is our opinion that LTFS is very useful as a physical file-based transport mechanism but not for long-term storage or preservation. It offers no media encapsulation and relies on simple folder hierarchies to form important asset relationships. It has no support for spanning across storage media, which limits file collection sizes and scalability, and it is not applicable to every storage technology.

5. Archive eXchange Format (AXF)

The Archive eXchange Format (AXF), on a path to standardization by the Society of Motion Picture and Television Engineers (SMPTE), takes the concept of the object store to a physical level by offering a self-describing, self-contained encapsulation format for complex file collections. It is an open, standardized way of storing files or file collections of any type and size—along with their associated metadata collections—on any type of storage technology or device (e.g., flash media, spinning disk, data tape, or the cloud) while remaining independent of the host operating or file system, which supports the content’s long-term availability no matter how

storage or file system technology evolves. AXF has preservation at its heart, including core archival characteristics such as fixity, provenance, and context, all of which are described in the well-known OAIS reference model.

5.1. What is AXF?

At the most basic level, AXF is an IT-centric file container that can encapsulate any number and any type of files in a self-contained, self-describing, protected object package. The encapsulated package contains its own file system, which abstracts the underlying operating system, storage technology, and the original file system from the AXF object and its payload. It is like a file system within a file that can store any type of data on any type of storage media (Figure 2).

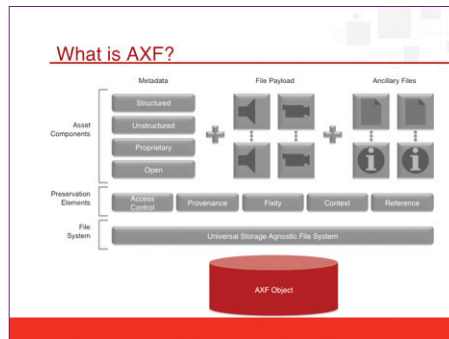


Figure 2. Archive eXchange Format (AXF) Universal Object Storage Format

It supports the inclusion of any amount of open or vendor-specific, structured or unstructured metadata encapsulated as part of the object itself, strengthening its self-descriptive nature. AXF also extends its self-descriptive nature to the storage media that contain AXF objects, allowing access using any AXF-aware system, and supporting long-term accessibility and protection regardless of whether the original system is available or not.

On the surface, one can say that AXF provides the same functionality as LTFS in terms of accessibility, ease of use, and portability, but then layers on top of it universality and the long-term storage and preservation features required in archival applications. AXF can be seen as the object-store extension of LTFS, overcoming many of its shortcomings such as lack of media-spanning support, no file encapsulation, and no metadata support.

5.2. The embedded file system

The embedded file system approach is a key attribute of AXF. It allows AXF to be both content- and storage-agnostic. In other words, because the AXF object itself contains the file system, it can exist on any generation of data tape, spinning disk, flash, optical media, or other storage technology.

Because of this neutrality, AXF supports the modern generation of data tape technologies—such as LTO5, TS1140, and T10000C—and because there is no dependency on the features of the storage technology itself, it supports legacy storage formats as well.

5.3. Comparison of AXF to other storage formats and approaches

It is our opinion that AXF offers significant advantages over other formats and approaches such as TAR and LTFS for long-term storage, protection, and preservation, including:

- AXF can scale without limit, which distinguishes it from legacy container formats such as TAR. Like AXF, TAR uses a file container approach that works on any file type of any

individual or total file size with support for multiple operating systems. However, TAR's age and tape-based roots yield limitations. For example, it incorporates neither descriptive metadata support nor a central index for file payload information, which makes random access to files challenging and slow. In large TAR archives, the performance penalty is significant, effectively making the format unsuitable for a situation where random access to individual files is required. Certainly, TAR has evolved over the decades, but typically in divergent paths that lead away from its open-source origins. As a result, it is difficult or impossible to recover some TAR packages today.

- Also in contrast to TAR, AXF incorporates resiliency features that make it possible to recover object contents, descriptive metadata, and media catalogs in many failure and corruption situations. Also unlike TAR, AXF incorporates fixity and error-checking capabilities in the form of multiple per-file and per-structure checksums.
- The embedded file system enables AXF to translate between any generic set of files and logical block positions on any storage medium, whether the medium has its own file system or not. This abstracts the underlying file system and storage technology, allowing systems that comprehend AXF to ignore any of their complexities and limitations.
- While AXF can work in harmony with LTFS, it also has advantages over it. LTFS relies on storage technology elements—such as partitioning and file marks on data tape—which hinders its storage capabilities and its performance. Likewise, LTFS is ineffective for complex file collections containing tens of thousands or even millions of related elements, as it lacks any form of encapsulation but instead relies on file and path arrangements.
- AXF can support any number and type of files in a single encapsulated package, which means these AXF objects can grow exponentially in size. With its support for spanning objects across media (such as over multiple data tapes), AXF has significant advantages over LTFS, which offers no spanning support and is therefore ineffective in large-scale archives typical in media operations.
- For the preservationist community, AXF offers support for the core OAIS reference model, with built-in features such as fixity (per-file checksums and per-structure checksums), provenance, context, reference, open metadata encapsulation, and access control.
- Once content is stored in AXF, the media itself can be transported directly to any system that also comprehends AXF, offering the same “transport” capabilities of LTFS with the additional features highlighted above.

These factors are key to AXF's ability to support large-scale archive and preservation systems as well as simple, stand-alone applications (Figure 3).

AXF, TAR, LTFS at a glance			
	AXF	TAR	LTFS
Simplifies file management by encapsulating files (encapsulation of any file)	For	For	
Scales to tens of millions files per object. Allows limitless object and file sizes.	For		
Maintains on-media catalog for content stored	For		For
Supports any storage technology (Spinning Disk, Solid State Disk, Flash Media, LTFS Data tape, Data Tape, etc.)	For	For	
Supports any generation of LTO, IBM TS11xx, Oracle T10000x, Sony SAITx, etc.	For	For	
Includes resiliency features allowing media catalogs to be recovered.	For		For
Includes long term preservation features as defined in the OAIS model.			
Supports Multiple Operating Systems.	For	For	For

Figure 3. AXF Advantages Over TAR and LTFS

5.4. How does AXF work?

AXF is designed so that each AXF Object (or package) has three main components regardless of what technology is used to store them (e.g., spinning disk, flash media, data tape without a file system, or data tape with a file system). These are:

- Each AXF Object originates with an AXF Object Header—a structure containing descriptive metadata such as the AXF Object's unique identifier (UUID and UMID), creation date, object provenance, and file-tree information including file permissions, and paths. Following the AXF Object Header is any number of optional AXF Generic Metadata packages. The AXF Generic Metadata Packages are self-contained, open metadata containers in which applications can include AXF Object-specific metadata. This metadata can be structured or unstructured, open or vendor-specific, binary, or XML.
- The next part of the AXF Object construct is the AXF File Payload—the actual byte data of the files encapsulated in the object. The payload consists of any number of triplets—File Data + File Padding + File Footer. File padding, which ensures alignment of all AXF Object elements on storage medium block boundaries, is key to the AXF specification. The File Footer structure contains the exact size of the preceding file, along with an optional file-level checksum designed to be processed on the fly by the application during restore operations with little or no overhead.
- The final portion of an AXF Object is the AXF Object Footer, which repeats the information contained in the AXF Object Header and adds information captured during the AXF Object's creation, including per-file checksums and precise file and structure block positions. The AXF Object Footer is important to the resiliency of the AXF specification because it allows efficient re-indexing by foreign systems when the media content is not previously known, enabling media transport between systems that follow the AXF specification.

Because of this standardized approach to the AXF Object construct (Figure 4), which abstracts the underlying complexities of the storage media itself, access to the content is supported regardless of the evolution of technology now and into the future.

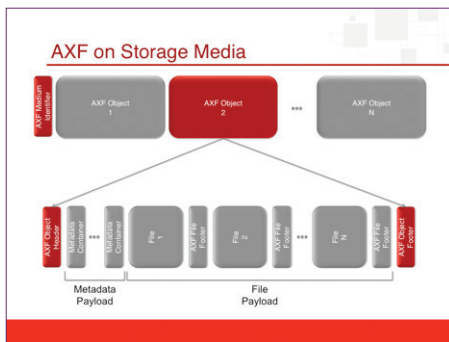


Figure 4. The AXF Container

5.5. Special structures for use with linear data tape

When used with the linear data tape typical in large-scale archives today, an AXF implementation includes three additional structures to incorporate key self-describing characteristics on the medium itself, ensuring recoverability and transportability:

- The first structure, which appears on the medium, is an ISO/ANSI standard VOL1 volume label. This is included for compatibility purposes with legacy applications to ensure they do not erroneously handle AXF formatted media and to signal applications that do understand AXF that they can proceed to access the objects contained on the medium.
- The second structure is the Medium Identifier, which contains the AXF volume signature and other information about the storage medium itself. The implementation of the Medium Identifier differs slightly depending on whether the storage medium is linear or nonlinear, and whether it includes a file system or not, but the overall structures are fully compatible.
- The third structure is the AXF Object Index, which is an optional structure that assists in the recoverability of AXF-formatted media. Information contained in this structure is sufficient to recover and reconstruct the entire catalog of AXF Objects on the storage medium. In a case where the application has not maintained the optional AXF Object Index structures, the contents of each AXF Object can still be reconstructed by processing each AXF Object Footer structure, adding to the resiliency of the format.

5.6. Who can use AXF?

Anyone. AXF was developed to meet a broad spectrum of user needs—from accessing petabytes of data in a high-performance environment to simply encapsulating a few files and sending them to a friend via email. AXF is scalable to accommodate an operation of any size or complexity. In all cases, AXF offers an abstraction layer that hides the complexities of the storage technology from the higher-level applications, while it also offers encapsulation, provenance, fixity, portability, and preservation characteristics. In addition, the same self-describing AXF format can be used interchangeably on all current storage technologies, such as spinning disk, flash media, and data tape from any manufacturer.

5.7. Where does AXF stand now?

Work is underway within SMPTE and its AXF Working Group to standardize AXF and promote it as an industry-wide method for storage and long-term preservation of media assets. Further, the committee hopes its work will extend far outside of the media and entertainment space and into the broader IT community because of its wide reaching applicability.

In April 2013, the working group submitted its final draft of the AXF specification for two-week review, which is the final step before balloting to become an official SMPTE standard. In September 2013, the committee agreed that all comments from the review have been adequately addressed. As of this writing, a final draft of the specification was being prepared for the official SMPTE ballot. After a two-week balloting period, the AXF format will become an official SMPTE standard.

5.8. The bottom line

AXF has the ability to support interoperability among systems, help ensure long-term accessibility to valued assets, and keep up with evolving storage technologies. It offers many present and future benefits for any enterprise that uses media—from heritage institutions, to schools, to broadcasters, to simple IT-based operations—and is well on its way to becoming a world-wide, open standard for file-based archiving, preservation, and exchange.

More information on AXF and standards-body activities is available at OpenAXF.org and smpte.org.

BRINGING EUROPE'S AUDIOVISUAL HERITAGE ONLINE: EUSCREENXL

Erwin Verbruggen (Netherlands Institute for Sound and Vision, Hilversum, The Netherlands),
Johan Oomen (Netherlands Institute for Sound and Vision, Hilversum, The Netherlands),
Eggo Müller (Utrecht University, Utrecht, The Netherlands)

Abstract

The recently started project EUscreenXL builds on its predecessor EUscreen, which successfully solved a number of problems regarding the creation of online access to audiovisual sources, notably the interoperability at technical and metadata levels. In July 2011 the project EUscreen was presented in the IASA journal. In this paper, we would like to present its successor EUscreenXL, which started in March 2013. We would like to share some of the objectives of the project and discuss why and how these could be relevant for all organizations holding audiovisual archives and collections. It is EUscreenXL's objective to establish a pan-European aggregator for audiovisual heritage. EUscreenXL makes audiovisual content and metadata from broadcasters and archives searchable, findable, and accessible across Europe and supports the use of European cultural resources through Europeana.

1. Introduction

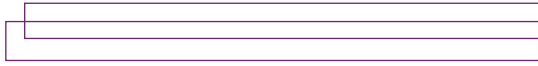
National broadcasters around the world in recent years have started initiatives that give viewers the possibility to review older content on the internet. Australia has ABC iView, Ireland has the RTE Player, the BBC provides the iPlayer, Turkish inhabitants use Tivibu and U.S. residents watch content on Hulu, just to name a few. There is on the internet a great need for cultural heritage materials, not in the least from the audiovisual field: ever since the habits of online viewing and television watching started to merge, viewers have become interested increasingly in personalized channels and content choices. Online broadcast services, however, rarely secure future access to audiovisual content from the past.

Audiovisual heritage is central to our remembrance of the eventful twentieth century. Professional films, home movies and television programs are, next to radio programs, photographs, and printed material, a main source for telling the past and, thus, for how we imagine a region's political, social, and cultural history. The cultural value of Europe's audiovisual heritage cannot be overestimated. It is a primary source for the understanding of European political and social history, while at the same time it demonstrates the richness of Europe's various national cultures through their different traditions and languages. Audiovisual sources represent European history, cultures, and societies of the 20th century in the most profound way. Making this audiovisual heritage accessible and meaningful for diverse types of users is of particular importance for the ongoing evolution of Europe and its identity.

Archives, broadcasters, and heritage institutions around Europe are aware of the meaningfulness of audiovisual content for cultural memory. There are many initiatives to digitize and to provide access to audiovisual content for both professionals and the general audience. But these initiatives, though partly very effective in creating digital collections, are fragmented. As a consequence, existing digital materials are not easily searchable and findable, especially from beyond specific national contexts.

2. From EUscreen to EUscreenXL

The EUscreen project (2009–2012), successfully established a network of co-operating archives and heritage institutions that follows a shared metadata schema to provide access to meaningful audiovisual content—content available on the EUscreen website and findable through Europeana, the European access point to digital and digitized cultural collections. Still, only a small fragment of the already digitized material (which in turn is just a small fragment of the existing audiovisual collections safeguarded by audiovisual archives, broadcasters, and heritage institutions) is searchable online and accessible beyond national borders. The omnipresence of



video on the web and the high interest of Europeana's visitors in this material underpin the urgency of taking action. As becomes clear from the search preferences on Europeana, users prefer audiovisual content over other types of sources. Yet, for a number of reasons—which include intellectual property rights (IPR), domain infrastructure, the work involved in digitization, accessibility, and metadata exchange—audiovisual material is still the type of content that is the most difficult to make accessible.

The newly minted project EUscreenXL builds on its predecessor EUscreen, which successfully solved a number of problems related to creating access to audiovisual sources, notably the interoperability at technical and metadata levels. For EUscreenXL it is essential to move beyond the success of EUscreen in order to increase drastically the amount of audiovisual content available through Europeana. It is EUscreenXL's main objective to become the Pan-European aggregator of existing digital cultural heritage for audiovisual collections. EUscreenXL makes audiovisual content and metadata from broadcasters and archives searchable, findable and accessible across Europe, thus supporting the use of European cultural resources through Europeana. As stated above, the precursor, EUscreen, has created direct access to a significant number of large and small broadcasters in Europe, which justifies its ambition to become the Pan-European aggregator to provide this type of highly valued content to Europeana. The greatest opportunity lies in developing a roadmap for aggregating critical mass and thus enhancing the discoverability and accessibility of the amount of already digitized audiovisual material. This is to make a comprehensive and growing collection of content available, searchable and accessible through Europeana for European citizens, be it the general audience, researchers and teachers, or professionals in the cultural industries. Our aim is to overcome the fragmentation of the audiovisual heritage sector in Europe and to foster the commitment of policy makers and professionals in the heritage institutions to act according to shared protocols. We do so by using innovative digital technologies and content storage possibilities such as cloud-based services and by guaranteeing interoperability between Europeana and the cultural heritage institutions.

EUscreenXL enhances and extends the existing EUscreen technical infrastructure. The EUscreen aggregation module included a mapping tool and a tool for managing the multilingual thesaurus. EUscreenXL continues using these tools and will extend the functionalities with automatic metadata enrichment, normalization, refinement and linking services. Using the experience gained in EUscreen, the aggregation workflow is continuously improved by developing services for mass annotation and enrichment. The search service is being enhanced by deploying semantic web technologies. Cloud-enabled technologies will be used for storing, indexing, and linking metadata allowing for distributed computing and scalable storage. The portal services will be improved by using state of the art technologies in video presentation (e.g., HTML5). Furthermore, user engagement services are being developed to support three pilot applications.

EUscreenXL aims to increase the content of EUscreen's present collection of ca. 30,000 topical items already viewable on the EUscreen portal by adding another ca. 20,000 high-quality items, thus creating what we call EUscreen's **core collection** of 50,000 items. The 20,000 items added to EUscreenXL will focus on long-running series programs owned by the participating content providers. The items are selected for their imaginative representation of the diversity of European history, culture, and everyday life. The content of the core collection will be contextualized (i.e., supported by rich information and interpretation of the material in its historical and cultural context) and this will provide the foundation for innovative user engagement pilots. It is the ambition of EUscreenXL to generate scenarios and protocols for innovative forms of re-use by three different types of users: general audience, researchers (also in their role as teachers), and creative industries. The 'XL' in EUscreenXL thus emphasizes that the proposed project extends and increases the achievements of its forerunner EUscreen.

3. Issues addressed in EUscreenXL

EUscreenXL particularly tackles six unsolved issues regarding online accessibility and usability of audiovisual heritage content. First, digitized audiovisual heritage is hard to find, since there is no pan-European aggregator for metadata and audiovisual content to help European audiovisual archives and heritage institutions make their material accessible online. Though European audiovisual heritage represents a tremendous cultural resource for Europe, as an imaginative resource for Europe's history of the 20th century, the visibility, findability, accessibility, and usability of it across national borders is, if it exists at all, very limited.

Second, so far only a few European archives and audiovisual heritage institutions use interoperable protocols for cataloguing and publishing audiovisual content. Also, new ways of cloud-based implementation of metadata gathering and accessibility have not yet been tested and applied in this domain. These solutions should lower the technical barrier for small- and medium-sized archives and should support them to contribute to Europeana.

Third, most accessible audiovisual heritage lacks meaningful contextualization and interpretation and, thus, is only ready for use by a specialized elite of academics (i.e., the few film and television historians working in a comparative framework). Dispersed digital audiovisual heritage—representing European history, societies, and cultures—is not linked meaningfully to comparable content on Europeana or to heritage institutions in other European regions and countries. There is a lack of editorial mechanisms serving well-defined, user-led activities. This not only restricts the findability of European audiovisual heritage but more importantly, it limits the potential usage of audiovisual heritage in the European context.

As a consequence, there is a lack of user engagement services readily available to support re-use of audiovisual heritage for leisure, research, or for the creative industry. Services that engage users with new approaches to European audiovisual heritage and its creative re-use are still underdeveloped.

A fifth issue is that within the audiovisual heritage domain, there is a lack of awareness regarding the need for contributing content through Europeana. The more than diverse range of public institutions, commercial players, and a growing number of private collectors, has created a situation where few institutions feel obliged or have the opportunity to contribute to Europeana. Furthermore, national, institutional, or commercial interests overrule open data advocacy for re-use of audiovisual heritage content.

Finally, there is still too low awareness among stakeholders in the audiovisual domain of the cultural, political, and economic potentials of Europeana resources. Today, only 1% of all Europeana content is video, whereas users are ten times more likely to select video material.

EUscreenXL is highly supportive of the principles behind the Data Exchange Agreement defined by Europeana. Opening up data and content has a wider political and economic context. For instance, it forms an important pillar of European policy on Public Service Innovation. EUscreen makes the metadata it aggregates available under the so-called CC0 license. CC0 is the “no rights reserved” in creative commons licensing. It effectively means the metadata is released in the Public Domain. Much of the content contributed by the partners involves in-copyright material. A few partners (for instance INA, Sound and Vision, NlnA) allow parts of their content to be re-used under open licenses, notably Creative Commons licenses. EUscreenXL supports these efforts, for instance, by including direct links to items on platforms that gather collections of open content available also through the EUscreen platform. The Open Images portal (operated by Sound and Vision) is a good example. Another way EUscreenXL supports access to open content and encourages content providers to enlarge their offer of open content is to research the consortium member states' legal practices in order to come to a common ground that could be viewed as a European standard for providing access to audiovisual material, mainly of a public service type. The goal of this activity is to increase awareness by the consortium partners of legal possibilities that exist elsewhere so that they can advocate for adoption of these practices.

4. The challenge of intellectual property rights (IPR)

Increased use of digital technologies has prompted a corresponding increase in the public's expectations regarding access to content. Copyright law structures many of the relationships between users, creators, and distributors of copyrighted content and should represent a balance between the legitimate interests of the different entities working with copyrighted materials.

Audiovisual heritage material is most probably the hardest to publish online from an intellectual property point of view. This is because rights for program materials are varied and complex, residing with a range of stakeholders including (but not restricted to) actors, performers, writers, directors, composers, production companies, and, at times, the broadcasters themselves. The rights not only vary across different European countries, but also often, for historical and commercial reasons, vary widely in each country. Whereas single state broadcasters in television's early years may have negotiated directly with individuals or agents and unions representing the range of stakeholders working in television, recent deregulation and expansion of products, services, and channels means that independent production companies now not only have a commercial stake in the television industry but also add an additional layer of negotiation and ownership. All these different factors mean that the clearance of rights for television programming can be both costly and time consuming.

The situation is complicated enough when reusing or repurposing archive materials on television itself, whether for repeat transmission or for use in, for example, news, documentary, or clip compilation programming. The problem becomes even more acute, however, when clearing rights for use on the Internet. This is because the Internet had not been conceptualized when many rights had been agreed or negotiated between broadcasters and the wide range of stakeholders. Even in those instances where rights had been cleared on programming forms for (re-)use on television, they often have to be negotiated again for the Internet. Finally, in some cases rights holders cannot be identified or, if they can be identified, they cannot be located.

Archives and broadcasters are investing in on-line services that provide selective access to their own archive material, but many of them are reluctant to 'lease' this material to other sites for public access.

The EUscreen project has demonstrated that it is possible to clear the rights for online access for thousands of hours of in-copyright content without undue expense. In many cases, time was invested to track rights holders and to seek permission for providing access through the EUscreen portal. Rights have been cleared to a large range of factual material, covering news, current affairs, and documentaries. In other instances, content providers have found it challenging to contribute popular program forms such as drama, music (pop, traditional, and classical), and sport. Research conducted within EUscreen pointed to the fact that, in most cases, copyright holders allowed users to create playlists and add comments. Only few allow material to be downloaded and remixed in derivative works. These findings have been taken into account in designing the portal functionalities, such as creating online exhibitions. The basic principle here is that the tools respect the specific access rights that the content providers give, and in effect therefore determine the type of interactions that can be supported. For instance, all content can be watched, but some archives cannot allow their content to appear in exhibitions.

EUscreenXL takes a very pragmatic approach to the issue of rights and will draw on experience of the EUscreen project to select, clear, and deliver digitized program content that is not hindered by restrictive IPR legislation, rules, precedents, or contracts. This means that a critical mass of content can be delivered in a timely, efficient, and cost-effective manner. At the same time, due to a lack of harmonization of legislation across the European Union, some countries will insist that material cleared for copyright restrictions under their national law must also be 'published' (i.e., 'streamed' in the case of audiovisual materials on the Internet) within its own borders. To achieve this, EUscreenXL will have a flexible technical architecture that will support streaming content from a central website server, provided by the technical partner Noterik, while simultaneously allowing material to be located physically (i.e., to have its streaming server) in any of the partner locations.

EUScreenXL invests in understanding the complex rights issues in an online environment, as well as new emerging user cultures and media practices from a creative industry and user point of view. As a result, EUScreenXL develops strategies, recommendations, and guidelines for solving these issues. Specifically, EUScreenXL creates pilots in three main application areas (the general public, researchers, also in their role as teachers, and creative industries) to discover the issues and organizes a series of activities that collect and organize the findings into useful resources that facilitate both the deployment of immediate solutions and the future design of new solutions. This development work is led by the Aalto University School of Arts and Design in Helsinki, which has specialist IPR knowledge and experience.

Second, we create a pan-European overview of the status quo of adding audiovisual content to Europeana (and the European Cultural Commons). This includes an assessment of IPR regulations in all EU member states that takes earlier work into account. The EUScreenXL network then seeks to develop and promote long-term IPR policy solutions. These solutions will be circulated and disseminated amongst the network members, and amongst stakeholders and policy makers in further workshops, events, papers, or memoranda.

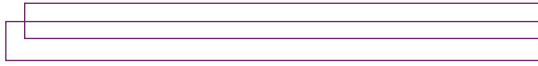
5. Strengths of a European approach

Europe has the largest and oldest (and most used) audiovisual collections in the world, the result of decades of commitment to public service broadcasting. These archives sit at the heart of the media creation and distribution industry, and also have significant involvement in web-based access to content. By aggregating and enriching a high amount of European audiovisual heritage, EUScreenXL contributes to the presentation of Europe in the digital cultural and creative industries, supporting the visibility of content in Europeana and stimulating its use and reuse on a permanent basis. Moreover it supports the concept of Europe in extending the number of contributing partners.

Innovation in the heritage sector requires a coordinated effort. Europeana, connecting the collections of over two thousand institutions, demonstrates the importance of coordinated efforts in the domain of cultural heritage. For instance, Europeana has been instrumental in providing a legal framework for the exchange of metadata, and has led the creation of the Europeana Data Model, which will set the standard for how cultural heritage artifacts will become available on the web. Only by collaborating on a pan-European scale can these advances be established. EUScreenXL follows a similar approach, first by setting up the experiments with core-consortium partners, and second by a large outward facing campaign, working together with the Europeana Foundation.

Specifically, the challenge to make content from audiovisual archives publicly available is European in scale, and requires European-level responses, as opposed to national or local responses that run the risk of increasing the already dangerous level of fragmentation. In the public policy sector, there is a national and European responsibility to make content available and maintain the audiovisual heritage. Public-sector broadcasters and some media-owning institutions exist because of citizen's tax contributions and have a duty to maintain the heritage for the benefit of citizens. According to the Comité des Sages, digitizing and preserving Europe's cultural heritage is a gigantic task that may eventually cost as much as €100 billion to complete, although the benefits from wider access to culture and knowledge, education and the economy will justify the effort. Preservation is recognized as a key aspect of the process and a core problem for any born digital content; while digital preservation should be the responsibility of cultural institutions, Europeana is seen as the ultimate repository for all digital cultural material.

The Comité also recommended that a service "for the persistent identification of digital objects must be developed and maintained on a European level." Nine months after the Comité's report, on 28th October 2011, the Commission adopted a recommendation for a Digital Agenda: encouraging digitization of EU culture to help boost growth. In support of the Digital Agenda, Commission Vice-President Neelie Kroes said: "Europe has probably the world's greatest cultural heritage. It cannot afford to miss the opportunities offered by digitization and



hence face cultural decline. Digitization brings culture into people's homes and is a valuable resource for education, tourism, games, animation, and the whole creative industry. Investing in digitization will create new companies and generate new jobs."

Activities on this scale, and with this reach, can only be undertaken at a European level. A Best Practice Network in the area needs also to have a European scale in terms of access to research results and expertise across a wide range of domains and technical areas.

6. The nature of heritage collections and technical background

The cultural heritage domain concerns multilingual and multimedia cultural assets spread throughout Europe, with domains as diverse as visual arts, music, and science. Such diversity requires a multi-cultural and multi-disciplinary approach, such as presented with EUscreenXL, which necessarily involves specialists in digital library research, interaction design, and knowledge engineering. No single European country possesses the researchers with such a range of expertise and skills or has knowledge of the diversity of languages and cultures that the communication and dialogue in the enlarged EU aspires to cover. As a Best Practice Network, EUscreenXL brings together this expertise from across Europe in the fields of technology, archiving and digitization practices, IPR issues, exploitation and business models for sustained access to audiovisual content, and subject expertise in European television history and culture. It thus contributes to European knowledge building and knowledge sharing in the field of digitized cultural heritage, and of audiovisual heritage in particular.

7. Circulation and rights clearances

Controlling circulation and rights clearance is another major challenge, which has to be faced on a European level. This will be investigated in collaboration with Europeana. One of the goals here is to create a Pan-European overview of the status quo of adding audiovisual content to Europeana. This work is essential in order for Europeana to reach out to the audiovisual domain (e.g., broadcasters, memory organizations with audiovisual material, and players in the creative industries) and understand what services need to be put in place in order to maximize contributions to Europeana. In EUscreen we found that the situation in each member state differs profoundly, and that the only way to get a clear answer to the question of how to increase the amount of audiovisual material in Europeana is to invest in a Pan-European research effort. Also, we are certain that the involvement of Europe's public broadcasters can be helpful in raising awareness for Europeana. Some of the issues to be investigated are:

- a. The status of online collections.
- b. The need to secure institutional support (defining the mutual benefit).
- c. The legal framework (also in relation to PSI).
- d. The specific conditions and possible exemptions for including audiovisual content in educational platforms.
- e. The need to support visibility of Europeana content in the audiovisual domain.
- f. The assessment of technical requirements in terms of storage and encoding standards.

8. Exploring content from a truly European perspective

By providing enriched content from across Europe, EUscreenXL enables a truly European cross-cultural exploration of cultural, political and social media events that help to understand the national and European dimensions of European audiovisual content. Moreover the envisioned large-scale accessibility of television archive content, the work of contextualization, and the user-led approach, together with the development of user engagement pilots for three different groups of end-users will enable comparative and integrative research into the history of television in Europe as well as interactive and creative participation (e.g., information sharing).

Thus, EUscreenXL contributes to increasing cross-cultural knowledge in a field that is still underdeveloped, showing and broadly diffusing the potential dimensions of European audiovisual content. This is an important step towards a truly European cultural knowledge arena and relates closely to developing European citizenship.

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LEGAL AND ETHICAL ISSUES SURROUNDING THE ONLINE DISSEMINATION OF AUDIOVISUAL ARCHIVES: NEEDS, PRACTICES, AND SOLUTIONS DEVELOPED IN FRANCE

Myriam Fellous-Sigrist (*Sound Archives, French Railway Historical Society [AHICF, Pôle Archives orales], Paris, France*), Véronique Ginouvès (*Sound Archives, Mediterranean Research Centre for the Humanities [MMSH, Phonothèque], Aix-en-Provence, France*)

1. Introduction

Providing citizens with easy access to the results of research via online dissemination can revitalize the relationship between science and society. If research in the humanities and social sciences, and in particular their audiovisual sources, are to be included in this movement, an effort has to be made to understand and adapt to the requirements of online dissemination. Until recently, furthermore, audiovisual archives were rarely consulted by the public. Embracing the digital turn, therefore, will also represent an important shift for archival managers and researchers.

Two main questions can be posed regarding the accessibility of these audiovisual collections. First, how can online dissemination be reconciled with the ethical and legal respect due to persons and institutions involved in qualitative research projects? Issues of authorship, copyright, and confidentiality have to be taken into account. Second, how can the slow internal process of collecting, archiving, and disseminating such collections be combined with various external demands for rapid online visibility of the project and its results? With a focus on audio sources for the humanities and social sciences, this paper will outline possible answers to these questions by providing case studies of solutions currently being used and developed in France. These case studies will be described from the viewpoint of both the archivists and producers of such archives.

2. French context of these legal and ethical issues: background and current practices

2.1. General development of dissemination practices in France

The status of the informant or interviewee is at the core of the shift over the last forty years in the legal and ethical questions associated with interview processes and outcomes. The link between the informant and the researcher was once seen as a purely unilateral relationship where the interviewee was only supplying knowledge and the interviewer was in charge of the encounter. As a consequence, researchers only acknowledged informants as contributors to a collective discourse.

Until the 1990s, researchers did not sign recording agreements with their informants when conducting interviews as this was thought to be unnecessary and even counter-productive for their fieldwork activities. When humanities researchers started to follow in the footsteps of their colleagues from the social sciences—answering Philippe Joutard's 1979 call for "historians, [to] pick up [their] microphones"⁴⁵—it was still with the idea that they were the only authors of the recordings.

Indeed, French researchers, in their enthusiasm for going out into the field, were far from imagining that their recordings would be of interest to anyone other than themselves and their peers. But in the 1970s and 1980s, nevertheless, their watchwords were "collective memory" and "identity memory;" and they sought to record collections of "oral literature." Publications

45 He was inspired by the oral history movement that had started in the 1940s in the United States and later in the United Kingdom, where Paul Thompson's first guidebook to oral history was published in 1978: *The Voice of the Past: Oral History*. Philippe Joutard translated this book into French in 1983.

such as those by Marie-Marguerite Pichonnet-Andral⁴⁶, a researcher and sound archives manager at the Museum for Popular Arts and Traditions (Musée des Arts et Traditions Populaires⁴⁷), insisted that this literature constituted collective heritage and as such, legally speaking, belonged in the public domain.

Today, individuals who provide information are given greater consideration than they were forty years ago: it is acknowledged that they are active participants in the interview-making process. This shift is the result of researchers' reflection on inter-subjectivity and interactions between interviewee and interviewer.⁴⁸ Moreover, landmark texts such as the UNESCO Convention for the Safeguarding of Intangible Cultural Heritage (2003)⁴⁹ have contributed to this change and have helped increase awareness of a shared responsibility—not just limited to cultural elites—for the sources of collective knowledge.

2.2. Impact of online dissemination: new demands and new actors

With the availability of digital tools from the 1990s onwards⁵⁰, and the use of these tools in disseminating research findings, new ethical and legal questions were posed when making interviews public. The potential audience was suddenly much wider than it used to be for publications, exhibitions, and even radio and TV documentaries.

In addition to this new visibility of their work, interviewers are now solicited by new actors in the research field. Since the 2000s, funding institutions, such as ministries, research laboratories, major corporations, or national organizations dedicated to digitization, have all become key commissioners of projects involving digital or digitized interviews. In line with recent reforms premised upon the notion that research projects must demonstrate their economic impact in order to receive funds and support, these institutions often want to retain total control over the recordings made during the research projects that they finance.

This control over the sources created by researchers, and their dissemination, enables funders to justify investing money and using recordings for internal and external communication, training programmes, and paid distribution, among other options. On the other hand, online access to sources is also often a condition for obtaining public funds, in line with policies that promote generalized use of and access to new information and communication technologies (ICT) as a factor of education and innovation in society.⁵¹

As a result, these new actors in the research world have contributed to ensuring better quality preservation and visibility of audiovisual archives. Yet questions still surround recordings with unclear legal status (because no copyright contract can be found) and those that do not allow online display. Some items from a collection or even some entire collections may, therefore, not be included in the digitization and dissemination process. This raises two major problems: these recordings may be set aside and may become invisible, and this, in turn, may have an impact on the integrity of collections.

46 For forty years, Claudie Marcel-Dubois and Marie-Marguerite Pichonnet-Andral have collected five thousand hours of recordings, mainly songs, music, and tales, across France.

47 In 2013, this museum was renamed as the Museum of Europe and Mediterranean civilisations (*Musée des Civilisations de l'Europe et de la Méditerranée*, MuCEM).

48 See for instance the chapter on "Ways of listening: different approaches to interviewing" in *The Oral History Reader*, ed. by Robert Perks and Alistair Thomson (London: Routledge, 2006).

49 The text can be found on the UNESCO website: <http://www.unesco.org/culture/ich/en/convention>

50 See for instance the list of "Oral history websites", first published in 1999 by Robert Perks in the 27th edition of the *Oral History journal*.

51 For example, France's Ministry of Culture will only provide finance for digitization through its National Digitization Programme for which one of the conditions is that the entire collection must be accessible online.

Until recently, target publics have not shown much interest in these questions. But there is now a strong demand for the restitution of archives from various social actors: media professionals, teachers and trainers, artists, performers, documentary-makers, and ordinary citizens. In addition, communities and individuals are also now seeking archives of their own history and intangible heritage. In the context of the democratization of digital tools and the generalization of their use, they do not understand why recorded interviews cannot be re-used.

2.3. A case study of this shift: the Sound Archives of the Mediterranean Research Centre for the Humanities⁵²

This Sound Archives centre was opened in 1979 within the premises of the University of Aix-en-Provence.⁵³ Its first collection comprised interviews recorded by two researchers, Philippe Joutard, a historian, and Jean-Claude Bouvier, an ethno-dialectologist. Their objective in creating such a centre was to offer a place where researchers using field material could preserve their recorded sources and share them with other researchers. Their long-term objective was to establish a vast corpus of sound archives for researchers in several humanities and social sciences fields: ethnology, sociology, linguistics, political sciences, history, geography, musicology, and literature.

These two pioneers were unsure how to organize the new collection. They decided that informants would not be identified by their names but only with a number. Only the researcher's name would be mentioned in the description of the sources. All personal information relating to the interviewees would be available in the files provided along with the recordings. Even though there was then no legal requirement to maintain anonymity, the two researchers gave no clear reasons for this decision. They had to invent rules for organizing the records that would allow easy access at a time when there was still very little experience in this field to draw upon. As a result, legal implications were simply not taken into consideration.

In 1997 these sound archives were transferred to the Mediterranean Research Centre for the Humanities in Aix-en-Provence where more audiovisual sources, recorded by researchers from fields other than history and ethno-linguistics, were added to the growing collection. A few years later, the database⁵⁴ of the collection was made available on the Internet and, almost immediately, informants or their relatives recognized their contributions to field research from details provided in, or circumstances relating to, the interviews. They contacted the Sound Archives and asked to be given copies of the recordings. They also wanted their family names to be clearly included in the database and the recordings to be made available via open access.

After 2000, following discussions with researchers who had donated interviews, the informants' names started being systematically included in the description of recordings entering the sound archives database. Obviously, there were some exceptions. These mainly occurred when researchers specifically requested anonymity for informants or when they only provided codenames in order to ensure their anonymity. The Sound Archives now holds 8,000 hours of digitized and digital recordings, the results of field research conducted between the 1950s and today. More than 1,000 hours are now available in open access, via the online catalogue of the research centre, and in conformity with current legal and ethical rules.

Today in France, the online dissemination landscape includes diverse practices. These vary from providing access to the description of records only to making interviews available via extracts or even in their entirety. For many owners of fieldwork recordings such as interviews, however, the legal and ethical issues surrounding this dissemination remain opaque. And yet it is

52 The *Maison méditerranéenne des sciences de l'homme* is part of a network of 22 national research centres specialized in the Humanities and Social Sciences.

53 In 2012 the University of Aix-en-Provence was reunited with two other universities and is now part of the University of Aix-Marseille.

54 This database can be accessed via the following link : <http://phonotheque.mmsu.univ-aix.fr/> .

imperative that archivists and researchers understand these issues and adapt their methods to opening up these resources to the public. This need is especially acute because researchers are not only under pressure to place them online and make them available to the widest possible audience, but to do so quickly, often while the research project is still ongoing.

3. Researchers' needs, pressure for rapid online visibility, and solutions found so far for ethical and legal problems posed by online dissemination

3.1. New needs of researchers

With the possibility and necessity of disseminating their audiovisual sources on the Internet, researchers are faced with a paradoxical situation. On the one hand, it has never been easier to access pictures, films, and sounds, thanks to the proliferation of documents available on the web and the availability of affordable and easy-to-use digital tools and software for capturing and displaying new research materials. On the other hand, restrictions limiting or even preventing the dissemination of many of these sources have also multiplied, due to researchers' new legal and ethical obligations.

Researchers have, therefore, new needs. Often it is archival managers' role to satisfy them. In their everyday work, they are worried about a wide range of apparently inextricable legal questions that they must take into account: copyright, informants and relatives' rights, interpreters' rights, privacy, database and public information protections, publishers' rights, and respect for trademarks, among others. In addition, ethical constraints can seem particularly restrictive for interviewers. Collected sources, for example, may contain information that can be prejudicial for individuals or communities in which they were produced, or for the person carrying out the research.

And yet, at the same time, fieldwork is increasingly important, both within and outside the academic world. Since the 2000s, it is more and more common in France to collect recordings and to use methods such as oral history in cultural and research projects. Audiovisual sources are now part of archives collections inspired by both social sciences and humanities disciplines and stored in university departments, research libraries, local archives centres, museums, private and public institutions' heritage departments, and cultural organizations. In addition to recordings, documents produced during research such as field notebooks are now being enhanced. They can now, for instance, be seen in exhibitions, where they provide background information on the objects or audiovisual recordings on display. They are considered to be 'archival material' and, as such, become cultural heritage.

3.2. Issues arising from the pressure for rapid online visibility and approaches developed to tackle them

The rapid development of efficient digital tools and infrastructures, combined with the demands by new social actors described above, mean that online visibility must be achieved quickly. But, as will be outlined below, putting qualitative audiovisual material online requires time, at least if legal and ethical imperatives are to be respected. The slowness of the process of archiving, editing, and uploading such data conflicts with the need for rapid online visibility.

This conflict is perhaps best illustrated by issues arising from the visibility and audibility of oral history online. Several ethical and legal questions are posed by choosing to upload interviews in full and not just extracts. These call for choices to be made about the content and identity of the recordings. Oral history interviews are situated at the intersection of private memory and public memory.⁵⁵ As such they typically deal with events that are landmarks in community

55 See Anna Green's article on that topic: "Can memory be collective?" in *The Oxford handbook of oral history*, ed. by Donald Ritchie (New York: Oxford University Press, 2011).

or social memory and should therefore be made available to a maximum number of people in society. But they are also narratives told by particular persons and dealing with particular lives, families, career paths, and so forth. Interviewees must be respected as both individuals and authors.

The question is how to distinguish, if possible, between the domains of public and private memory. As a guide we should follow the interviewees' wishes. These wishes can be expressed in two different ways: either during the encounter (whether said off-record, during the interview, or as something to be written down but not recorded) or as an option selected when signing recording agreements (choice between different mediums of display, anonymity, dissemination of personal and family pictures and professional information). The law, secondly, cannot be ignored. In the French context, the laws of intellectual property, information, and cultural heritage are used to regulate research interviews. Efforts to respect these laws have to be made by seeking to protect not only interviewees but also their families, persons named in the records, interviewers, and the organization hosting the cultural or research project.

There are ethical and legal reasons why secrets should not be revealed and traces of defamation should not be preserved, but it is often the case that oral history interviews contain precisely such sensitive information. If one wants to avoid a choice between simply uploading the entire interview or only a brief description of it, a series of complementary alternatives are available to the archives manager. First, it is possible to edit the recordings by making audio cuts in the content or anonymizing the interview (this can be done either by deleting everything that helps to identify the interviewee or, alternatively, only those parts containing sensitive information which could be used to identify people the interviewee is talking about). A second option is to ask witnesses to double check the records before they go public, ensuring they are aware of what could be heard by the public. Lastly, one might want to establish different degrees of access to the records: a "light" version for the general public and a more complete version for persons specialized in the topics covered by the interview, mainly researchers. This can be achieved for instance via a system of passwords used to access different parts of the sound archives website.

These legal and ethical challenges, which arise from the decision to put qualitative audiovisual material online, can only be tackled with careful planning of the whole archiving and dissemination process. This process, however, can be extremely slow as illustrated by the following case study.

3.3. A case study of these ethical, legal, and archiving issues and the development of a method: the online audio repository of the French Railway Historical Society

These issues have been posed during the course of a still on-going three-year oral history project conducted by the French Railway Historical Society. It began in 2011 and was commissioned by the French national railway company in order to give a voice, for the first time, to those of its former employees who had lived and worked during World War II. Altogether two hundred audio interviews (four hundred hours) have already been collected. Between April and October 2013, twenty-eight interviews have been made fully accessible on the website *Mémoire orale de l'industrie et des réseaux*.⁵⁶

The collection is comprised of semi-structured face-to-face interviews with former railway workers, today in their nineties, or with their close relatives (such as widows, children, and grand-children). Each recording lasts between one and five hours and for each a five-page agreement form is signed. They deal with everyday life and work in the French railway community between the 1930s and 1950s; they encompass many themes, such as life in company

56 This website, which was created in 2007, is a collective repository of oral history interviews that deal with French industrial heritage. It can be accessed via the following link: www.memoire-orale.org.

towns, the black market, forced labour in Germany, the presence of occupying forces, family life, bombings, deportation, resistance activity, post-war reconstruction, and the memory of this period.

The project team's objective was to create new sources for researchers specialized in this period and topic. The aim, correspondingly, is to make the interviews as widely available as possible with the hope that they will be used by researchers and anyone interested in this subject. Because this interview collection deals with sensitive episodes and subjects that are still controversial in France, it is crucial to be careful with what is uploaded. The memory of the war is still very present in society and conflicts are ongoing, especially in the areas of collaboration, resistance, and deportation. But, in addition to this national context, the interviews also often contain information about a variety of sensitive themes associated with the interviewee or someone named during the interview. This can include private life (such as information about current or past health, or family issues such as divorce and adultery) and violence (either when a crime is revealed or someone accused of it, or when the interviewee describes a violent episode in ways that may shock listeners if they are not warned in advance).

Four key principles were agreed upon by the team members to guide them in tackling these challenges. First, keeping track of everything is essential. Both compressed and uncompressed files are stored along with edited and unedited versions of the records. When the content or the sound is edited, a technical document mentions where and why the cuts were made or the sound improved. Second, teamwork is at the core of the approach. The archival and dissemination planning was discussed by the whole team, and involved the interviewers, archivists, researchers, and project managers. Third, the choice was made to take a minimum of risk. This was because of the sensitivity of the themes and because of the degree of trust placed by interviewees in the organization (in many cases they have spoken about the period or some events for the first time). Finally, summarizing was preferred to transcribing. Even though it is just as time-consuming, writing up detailed summaries enables the creation of tools that help users to search through the interviews and to select the extracts that interest them. The records are always presented online already divided into sequences and with this accompanying long summary. In addition, and if the interviewees have agreed, their picture taken during the interview is uploaded.

The results of this archiving and disseminating process, even if satisfactory in legal, ethical, and professional terms, have been very slow to materialize. Out of fifty interviews (online or ready to be uploaded), five have been anonymised: three because the interviewee wished it and two as a result of the team's decision-making. Out of these same fifty records, cuts were made to forty of them because of ethical or legal considerations (other cuts were related to sound quality). Interviewing began almost two years ago and two hundred records have already been stored. Because of the slowness of these procedures, however, only twenty-eight are online and only thirty more will be in the very near future. On average, it takes fifteen hours to complete the storing, editing, analysing, and uploading stages of the process for one hour of recorded interviews.

It is clear that, once completed, the online collection will offer a very rich and complex picture of French society between the 1930s and 1950s, featuring an impressive diversity of regions, cultures, social classes, generations, gender, and professions. Nonetheless, this careful planning for online dissemination of full interviews has obvious limits. The tasks enabling full online access are very time-consuming and delay the development of other tools of dissemination, such as publications and exhibitions. Moreover, and even if this only happens for a marginal part of the collection, the legal responsibilities of the archivists and their team sometimes cause it to be that what interviewees ask for is occasionally not respected. Copies of interviews, furthermore, can rarely be sent to the informants quickly because of the time it takes to edit them. In many cases informants fail to understand why it sometimes takes even a year for this to happen.

3.4. Possible solutions at the collective level: collective guidelines

Efficient digital tools are being developed by researchers⁵⁷ that will soon make it easier and quicker to build online searchable databases of interview collections at an affordable price. In the meantime, however, solutions are still required to cope with the current situation, contradictory as it is. Archivists and producers of audiovisual records have to reconcile the respect of ethical and legal issues and the imperative for a quick online dissemination.

When the collection has already been constituted or when the budget and calendar of the archival repository cannot allow for such a slow process of archiving and disseminating, it is probably best to choose not to publish full interviews online. Extracts can, in such cases, be the most appropriate way to achieve online visibility while still respecting legal and ethical norms, even if the risk is that users may not contact the archives centre and come to listen to the whole recordings.

Another solution to make it easier to deal with this situation can be found in pedagogy. It may be necessary to explain to funders and to the public why the archiving and disseminating process can be so slow. More importantly, it is essential to anticipate these difficulties and to train⁵⁸ producers and users of such archives so that the time taken in documenting the collection, establishing copyright, or locating sensitive parts of interviews is reduced.

In 2011 these ideas inspired the establishment of a French working group that aims to create a best-practice guide for online dissemination in the humanities and social sciences. This guide is a collective project led by archivists, jurists, and researchers from a number of different fields. The objective is to propose concrete solutions for answering the questions outlined above. The drafting team uses several collaborative tools: a mailing list for people interested in these issues⁵⁹, annual seminars, and a scholarly blog⁶⁰ where texts are posted for peer-review. These collective and interactive working methods aim to have participants' proposals on legal and ethical issues seen by as many people as possible in order to encourage debate and broad participation. On the blog, concrete matters are dealt with, such as "how to draw up a contract for the transfer of rights for an interview," as well as more in-depth ones, such as, "The contract: an agreement between the witness and the interviewer ... and a legal necessity." Interviews with Internet experts or researchers who have released their archives online are also, additionally, being recorded for the project, and important texts on legal issues, such as "Who Owns Oral History? A Creative Commons Solution,"⁶¹ are being translated. The guide, finally, will include a glossary of agreed definitions and interpretations for French terms.

As the work progressed, choosing the title for the guide (*A Best Practice Guide for the Dissemination of Digital Resources in Humanities and Social Sciences*) became a real challenge, as some participants did not want to produce over-restrictive guidelines, or even a best practice guide, because some of the solutions described are not regulated by legislation and are there-

57 Such as Doug Boyd, Michael Frisch and Doug Lambert. Also see the website on "Oral History in the Digital Age" (<http://ohda.matrix.msu.edu/>).

58 Such an option has been used by the Oral History Society for several years already. The British organization conducts training sessions across the United Kingdom and offers online guidelines regarding ethical and legal issues (<http://www.oralhistory.org.uk/ethics.php#ethical-considerations>).

59 The list is still open and anyone interested is welcome to sign up. More information can be found on the project blog: <http://ethiquedroit.hypotheses.org/>.

60 The blog is located on one of the platforms created by the Centre for Open Electronic Publishing (CLEO): *Hypotheses*. This international platform contains 700 research blogs written in several languages (German, Portuguese, English, French, etc.). It facilitates collective publishing but, above all, it allows French scholars to join and contribute to the international research community.

61 Dougherty, Jack and Simpson, Candace. "Who Owns Oral History? A Creative Commons Solution." In *Oral History in the Digital Age*, 2012. Accessed October 20, 2013. <http://ohda.matrix.msu.edu/2012/06/a-creative-commons-solution/>

fore risky for those who might try to implement them. Instead, this guide will provide tools for archives managers and researchers for each stage of the online dissemination process. It is hoped that it will serve as a reminder of the essential values that managers and producers of archives are bound to respect: the integrity of collections, systematic contextualization of field work and research, current and future rights of both authors and users, and the use of available tools meeting contemporary standards.

4. Conclusion

In addition to the awareness of the digital context, its rapid development, and its new requirements, research and archival communities must take into account legal and ethical issues that preceded the digital turn and which it has now exacerbated. Archivists and researchers need to find a collective response to these issues that anticipates difficult situations arising from both researchers' needs and external pressures.

In a society where the world of science must be both transparent and global, legal and ethical codes are crucial tools that everyone working in the production and use of audiovisual archives must take into account. Current legislation should be interpreted, commented upon, and questioned, and members of the academic and archival community should seek to contribute to its future development.

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ÖSTERREICH AM WORT: A PROJECT GIVING WEB ACCESS TO MORE THAN 5,000 RECORDINGS

Hermann Lewetz (*Austrian Mediathek, Vienna, Austria*)

This is the story of a project from the Austrian Mediathek (AM), a mid-sized institution with twenty-two employees.

1. The project

Submitting concepts for projects is one of our strategies for acquiring extra funding to digitize our immense holdings. One recent project was Österreich am Wort (OaW). The main goal of OaW was to put selections of recordings on the website that represent each of the numerous collections stored in the archive of the AM.

In the world of scientific research, audiovisual recordings are often ignored as primary resources. One reason is the difficulty for scientists to get continuous access to them. One aim of OaW, therefore, was to publish potential sources in a way that would secure persistent access for researchers who want to use these sources in their work, as well as for those who want to evaluate the primary sources used by these researchers.

When we proposed OaW, we aimed to publish approximately 1,000 video and 4,000 audio recordings during a period of three years.

We used some of the project resources to finance additional equipment, especially for the video digitization. But above all, the project resources went towards developing the infrastructure for managing metadata and, especially, for clearing copyrights. The digitizing of audio recordings and part of the video digitization was done with existing resources at AM.

The project ended 1 September 2012. The result can be accessed online (<http://www.oesterreich-am-wort.at/>).

OaW was funded with money from the federal government of Austria's Department of Education, Arts, and Culture.

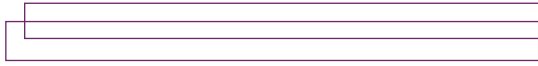
2. The plan

The plan was that two persons would evaluate all collections and make a list of potential recordings that could represent the content. With the first selections in hand, another team would start to clarify the copyrights. Then the workflow of digitization would be initiated.

While the AM has been digitizing audio for more than ten years and, therefore, was ready for the task of digitizing large collections of audio recordings, this project marked the begging of the AM's foray into the world of video digitization. The way forward looked quite simple. There was an eagerness to purchase and use the recommended video system (SAMMA solo), and the project offered the funding. With the new equipment in hand, we just had to start digitizing the selected video recordings.

Another team would enrich the metadata in the catalog. Meanwhile an outside company would design, program, and install a website in which not only the new, but all the AM audiovisual content would be presented. The new idea was to present each recording in an individual page, instead of having several items on one site as we did before. This way, it would be possible to generate an individual link for each recording. In the era of Europeana and other large search aggregators and in light of the Internet's reliance on linked content, this became an essential feature.

This change in our web structure resulted in a complete new architecture that also required a complete update of existing web exhibitions.



We generated web copies of the audiovisual resources from the digitized archive copies. Although most of such projects are funded only to give web access to content, we insist on digitizing in a way that is equally adequate for long-term preservation. This often results in the fact that the digitized files do not meet the requirements for web copies. For example, for preservation goals we aim to make an image of the complete content of a carrier. For a web copy it is not acceptable to watch three minutes of color bars before the desired content begins. Therefore after digitization we had to edit many files for use online.

A CMS was used to manage all data and metadata for the website. The majority of the data was generated automatically by importing metadata and links from our existing catalog. Some metadata had to be altered manually.

3. The bumps in the road

As it happens in all good movies, this project did not come off without a hitch.

3.1. Evaluation

Many carriers just had poor descriptions about their content or, even worse, were labeled incorrectly. In many cases this made it necessary to listen to, or watch, the recordings in advance in order to make an evaluation possible. Multiple formats require multiple machines. But at the AM the broadcast machines are attached in a rack inside the technical room and were needed for digitization. Long research in the technical room would disturb the digitization process.

The thought of winding all the original material forward and backward just for evaluation did not seem to be promising. Therefore, in many cases, it was quicker first to digitize and then evaluate the content.

Thus the expected amount of recordings that would be digitized increased immensely.

3.2. Copyright

The procedure for clarifying copyright took too much time. First we had to detect potentially sensitive rights issues by using the metadata for each recording. Then we attempted to track down the right holders and contact them. Digitizing revealed additional rights holders who were not mentioned in the metadata. Because of the limited time frame, digitizing had to be started before all rights were clarified. Otherwise the digitizing would not be finished in time. Some of the digitized recordings could not be published online in the end because of a negative response to the inquiries or just because the rights holders were undetectable. In order to reach our predefined goal, we had to digitize many more recordings than we originally expected. One positive side-effect of all the numerous letters we sent to clarify rights was that many people who had never heard of the AM suddenly developed a personal interest in the archive.

3.3. Video digitizing system

At first we intended to buy a SAMMASolo. This system is able to digitize video and to generate a MXF container with the JPEG2000 codec (lossless compression) using a specially manufactured video card to do the processing. Tests however showed that it was quite difficult to use those archive files outside the SAMMA system. Seen from the perspective of an archive this would lead to an unacceptable dependency. So we searched for alternative formats/codecs that would satisfy the criteria for long-term preservation. We discovered the capabilities of ffv1, an open-source codec, but the SAMMA system could not work with this codec. We did not find any other system that could substitute for the SAMMASolo system. So we invested the money that we were going to use to purchase a SAMMASolo and we invested it in developing a complete video digitization system called DVA-Profession (www.dva-profession.mediathek.at).

All in all, OaW became more complex than we originally expected.

4. The results

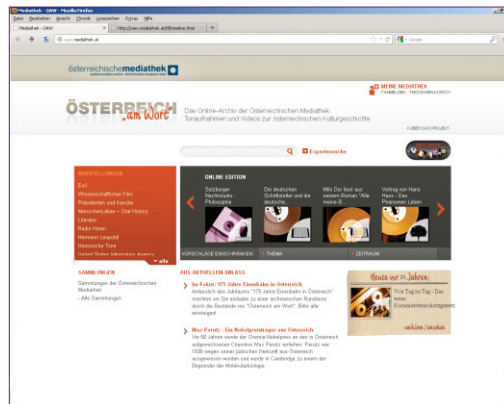


Figure 1. The homepage of OaW (www.oesterreich-am-wort.at).

From the OaW homepage, when you start a search, for example “Weihnachtsfilm,” you get a list of possible matches.

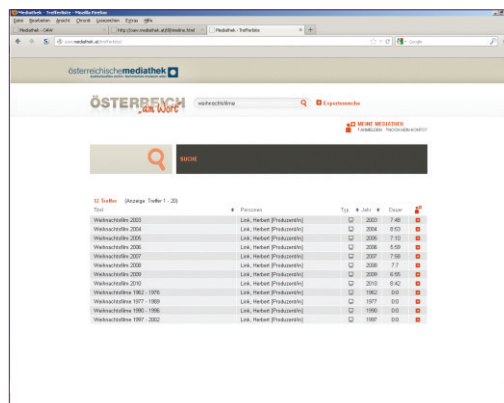


Figure 2. Results from a search in the OaW.

They all belong to a collection with videos made by the filmmaker Herbert Link. He recorded every Christmas evening with his family since 1962.

The short movies vary from super 8 to several consumer video formats and show the family members growing older year after year. Link continues to make these recordings.

This is just one example from about 100 collections, which have been made accessible through OaW. Choosing “Weihnachten 1962” we navigate to the page of Link’s recording of Christmas Eve, 1962.

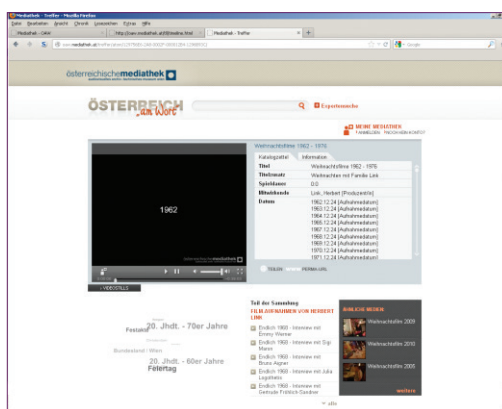


Figure 3. List of Link's recordings from Christmas Eve, 1962.

On the left, in Figure 3, you can see where the player is integrated and beside it is a frame showing the descriptive metadata imported from our catalog. Beneath you see some common features that give suggestions for other relevant items. On the left is a cloud generated from keywords that are defined in the catalog; on the right, some suggestions of similar holdings also generated from defined fields in the metadata.

During the digitization workflow, DVA-Profession creates thumbnails in a frequency of one for every 1,500 frames, which is the equivalent of one thumbnail per minute for PAL video. In this way it is possible to survey the length and the content of the recording. These thumbnails are used as markers in order to navigate through the web file, which in our case is a flash file.

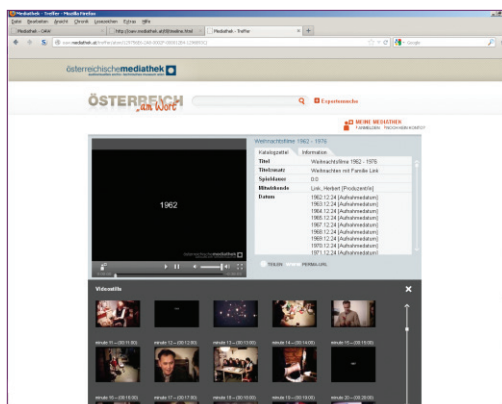



Figure 4. A view of thumbnails in OaW used to help users navigate through a given video.

For instance, when you click on thumbnail number 11, the cursor jumps to the eleventh minute of the video file and starts to play (see Figure 4).

The URL is managed by a server that re-addresses any change to the link address. This is necessary to ensure the validity of the link address and the continuous access to the recording.

Clicking on the "Information" tab, which can be found in the gray box to the right of the video stream, shows extra information and descriptions that have been collected manually in addition to the descriptive metadata.



5. Summary

OaW, which had the objective of increasing the continuous access to audiovisual source recordings, grew much larger than originally expected. Instead of using an existing video digitization system we developed a completely new and alternative system and published it under a Free Software License (GPLv3 - GNU General Public License). By taking over responsibility for the signal chain through the usage of a self developed system we learned a great deal about video signals, about converting video, and about the strange behavior of some delicate video recordings.

Workflow and time scheduling forced us to digitize in advance before we had clarified all copyrights. In the end we digitized over 2,000 videos and approximately 22,000 audio recordings. Some copyright clearances were acquired after the deadline. Now we are able to give online access to more than 7,400 audiovisual resources. Combined with the 6,000 recordings that had been published in earlier web exhibitions, through OaW, we made almost 14,000 audiovisual recordings accessible on our website. Meanwhile, we just finished another project called "Journale." This increased the number of accessible recordings on the AM website to more than 20,000.

The author would like to thank Gabriele Mathes, Gabriele Fröschl, and Bertram Lyons for their help with this article.

DIGITIZATION AND PROVISION OF FREE ONLINE ACCESS OF THE ARCHIVAL SOUND RECORDING COLLECTION AT THE NATIONAL LIBRARY OF LITHUANIA

Živilė Časaitė (Music Department, Martynas Mažvydas National Library of Lithuania, Vilnius, Lithuania)

The Music Department of Martynas Mažvydas National Library of Lithuania started acquisition of Lithuanian sound recordings in 1961 with the aim to collect and preserve them as a sound cultural heritage and in order to develop a collection for public access.

Although acquisition of the collection lasted almost fifty years, the collection received the status of an archive in 2007. The Regulations of the National Archival Fund of Published Documents approved by the Ministry of Culture in 2007 state that the Image and Sound Archive (hereafter, Archive) of the National Archival Fund of Published Documents is preserved at the National Library of Lithuania. According to regulations of the National Library, the Music Department maintains and preserves the archive.

Image and sound documents issued in Lithuania or issued abroad and related to Lithuania by language, authorship, or subject are collected and preserved in the Archive. Acquisition of the archival collection is organized on a basis of legal deposit copies, documents acquired from physical and legal persons, document exchange with Lithuanian and foreign libraries as well as other information institutions, donations, heritage, or documents received by other legal means.

At this moment, the Archive contains 13,083 titles. There is only one physical unit per title; therefore the number of titles is equal to the number of physical units preserved in the Archive:

- Shellac records (2,534 titles)
- Vinyl records (2,209 titles)
- Audio cassettes (3,558 titles)
- Videotapes (173 titles)
- CD (4,006 titles)
- DVD (603 titles)

The comprehensive collection of Lithuanian shellac records forms the most important part of the Archive, collected in cooperation with researchers of Lithuanian records, collectors Algirdas Motieka (Lithuania) and Vytautas Strolia (Lithuanian emigrant who spent the majority of his years in the USA and donated his record collection to the National Library of Lithuania in 2009). The records were issued in various countries from 1907–1966.

This part of the Archive was not accessible for a long time. We had no technique for shellac records playback; breakable and fragile records were not provided for readers' use. With the aim of preserving these shellac records as a part of Lithuanian cultural heritage and to disseminate them to the public, the Music Department in 2003, 2004, and 2007 implemented a long-term shellac records digitization project supported by Culture and Sport Support Foundation of the Republic of Lithuania. Over one thousand shellac records have been digitized—only a segment of the collection. Digital copies of the records are now available on CDs for all visitors of the Music Reading Room of the National Library. It must be noted that the digitization process was organized in an acoustic mode, using an old gramophone (made around 1928), therefore the sound quality of these digitized shellac records, which were also in poor physical condition, is not very high.

In order to ensure preservation of the entire shellac archive, and for better online accessibility, modern digitization technologies should be used in future projects. This became a reality when the National Library in 2010 together with nine partners—libraries, museums, and archives—implemented a national project: "Development of Virtual Electronic Heritage System" (the project ended in 2012, its duration lasted thirty months). This project was the extension of another project, implemented in 2005–2008, which was called "Creation of the Integrated Virtual Information System."

The Martynas Mažvydas National Library of Lithuania received financial support of 12.4 million LTL from the European Union Structural Funds and state budget for realization of the project “Development of the Virtual Electronic Heritage System (VEPS)” in line with the implementation measure No.VP2-3.1-IVPK-04-V-01-001 “Lithuanian culture in the information society.” During this project, a seamless system for digitization of cultural heritage was created. Also digitization, preservation, and access workflows for cultural heritage objects were standardized. An integrated data bank of digitized objects and a web portal were established.

Common efforts of the memory institutions of the country resulted in the digitization of over 280,000 digital objects (e.g., books, periodicals, manuscripts, and 2D graphics). 11,098 sound recordings were digitized and preserved in the Image and Sound Archive of the National Archival Fund of Published Documents in the National Library.

The Archive contains 4,743 items (2,534 shellac records and 2,209 vinyl records). Through this project, 1,072 shellac records and 1,133 vinyl records were digitized—the equivalent of 2,194 musical works from shellac records and 8,904 music works from vinyl records. In total, 40,640 minutes (678 hours) of sound recordings were digitized (see Figure 1).

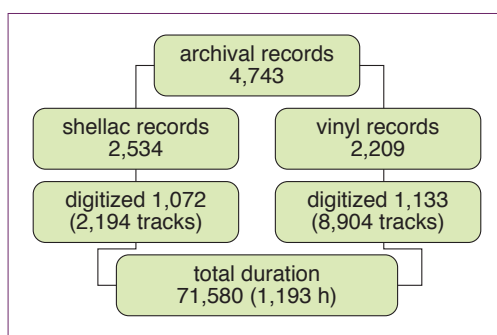


Figure 1. Total sound recordings digitized as part of the VEPS project.

The records were issued in various countries. The publishing period encompassed 1907–1966 for shellac records (1907 was the year first Lithuanian record was published), and 1941–1993 for vinyl records. The decision was made to digitize the remaining not yet digitized shellac and vinyl records, except for the records re-issued in CD format, re-editions, or repeating folk music.

The Project funds were used to acquire equipment for the digitization of records (i.e., Audio-technica AT-PL 120-USB professional turntable with ATP-2 and Grado 78C cartridge) and sound recording and editing software (i.e., Samplitude 11, Algorithmix plugin bundle). The records were digitized and encoded as WAV files and made accessible to users as MP3s. The labels and envelopes of the records were scanned for visual access.

Bibliographic records were formed in accordance with the “Regulations for creation of bibliographic records for digitized documentary heritage objects in the VEPS Information System,” prepared within the framework of the project. Bibliographic records were created using the UNIMARC format in the electronic catalogue of the Lithuanian Integral Information System of Libraries (LIBIS). Each musical work on the shellac or vinyl record is displayed in an analytic bibliographical record that is created for the original and its digital object. All versions of digitized objects are described in one bibliographic record.

The software, METS tvarkyklė, was created for transferring digital objects to the VEPS database and for presenting them for online usage. This software used the metadata exchange standard Metadata Encoding and Transmission Standard (METS). METS tvarkyklė is used for collections of digitized objects composed of digital files, object metadata, and technical and administrative

metadata. Using this software, digitized objects can be uploaded from various systems: LIBIS, Aleph, EALS, as well as METS files.

Since digitization and promotion is affected by copyright issues, we had to coordinate copyright and neighboring rights issues with the institutions administering those rights—copyright management association NCB / LATGA-A and neighboring rights association AGATA. Licensing agreements on the rights for digital reproduction of works and publishing them on the Internet were prepared for this purpose.

All digitized material can be found at the following website: www.epaveldas.lt. The free playback of the recordings is available; however, downloading is not permitted.

Digital objects within the VEPS system contain descriptive metadata. Users are able to switch to extensive records within LIBIS (library system), LAFSIS (archive system), or IRIS (museum system). Therefore there is a link between each object and its relevant description in the source system, and vice versa.

There are a few possibilities for searching sound recordings in the portal:

- Standard simple search
- Advanced search, where sound recordings can be found by the following parameters:
 - material composition (shellac, vinyl)
 - rotation speed (78, 45, 33 1/3 rpm)
 - sound format (monophonic, stereophonic)

It is also possible to search by collections. Collections of sound records are grouped according to subjects. One large part of the collection is vocal music; other parts consist of instrumental music, stage music, sacred vocal music, popular music, and literature records. Special attention is made to the first Lithuanian gramophone records, which is a very small yet very important part of the collection. It consists of only forty-five titles of shellac records.

The portal has been live for more than one year now. During this time (from May 2012 through August 2013), 4,517 sound files were accessed 12,924 times. The numbers demonstrate the popularity of the portal. We can conclude that Lithuanian users accept it and are willing to use it. The numbers could be bigger. During the implementation of the project we encountered a problem that is irresolvable at the present moment: the Law on Copyright and Neighboring Rights of the Republic of Lithuania only supports access to protected sound recordings on the Internet within the territory of Lithuania. This restriction is only for sound recordings with valid copyright terms. Works with expired copyright terms could be listened to outside the territory of Lithuania. However the copyright management association NCB / LATGA-A has not established the list of these works. Therefore, at the moment there are no works on the website that can be made available to the whole world.

Over 2,000 digitized Lithuanian shellac and vinyl records issued in various countries have been placed on the portal. Among them are the first Lithuanian records published by the Zonophone record company in Riga, from 1907–1909, and in Vilnius, from 1910–1911, which are very rare. There are also shellac and vinyl records that were issued in Soviet times, which represent the cultural panorama of Soviet Lithuania. Rare Lithuanian records issued abroad—in the USA, Canada, South America, and Europe—are also available. The vintage Lithuanian shellac records are in the framework of the UNESCO Memory of the World programme (2007) as objects of the Lithuanian National Registry.

Now we are sure of the necessity of digitization and we strive for its continuity. We aim to re-digitize the shellac records that were formerly digitized in acoustic mode and the vinyl records that remain un-digitized using modern technologies. In the long term we have plans to digitize audiocassettes that were not issued on CD format. All digitized archival material will be presented on the comprehensive Lithuanian cultural heritage portal (www.epaveldas.lt).

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AUDIOVISUAL ARCHIVES: AN ESSAY ON THE POLICIES OF ACCESS TO AUDIOVISUAL ARCHIVES FOR ACADEMICS, TEACHERS, RESEARCHERS, AND STUDENTS

Tedd Urnes (*Teddvie Audiovisual Archival Management, Oslo, Norway*)

1. Introduction

The site is Oslo. The year is 2000. The month is August. The event is the 19th International Congress of Historical Sciences and the International Association for Media and History, August 11–12. For those of you who do not know much about Norway, Oslo is the capital. Thirteen years ago I attended the conference mentioned to present a limited report about the official access policies of the members of FIAT/IFTA. My main resource was FIAT/IFTA's publication *Guide to Audiovisual Archives*, eleventh edition, 2000.

2. The goal

The year is 2013. The issue highlighted thirteen years ago in Oslo is still on the agenda of international conferences and seminars. The main goal of presenting a paper on the same issued evaluated in 2000 is to see if changes have taken place among the most important libraries and archives that have dominated the debate and the agenda of international conferences throughout the last thirteen years. Most of these archives are still members of FIAT/IFTA, IASA, and BAAC.

The question I asked thirteen years ago was, "Access for university studies, a national responsibility: yes or no?"

Twenty-five members answered negative to the question, which meant that none of the archives were advocates for a policy for those who wanted to use the collections for university studies. Sixty-nine members gave a positive answer to the question, stating yes, we do support university studies.

The Norwegian Broadcasting Corporation (NRK) was one of the institutions that answered no to this question in 2000.

It is of great importance to study the reasons why twenty-five archives said they did not have a positive approach to academic studies in 2000 and to compare these reasons to information gathered in 2013. Has there been any change over these thirteen years?

3. Access policies thirteen years ago

What were the main reasons archives did not support access requests from academics, teachers, journalists, and students thirteen years ago?

- No access to equipment for viewing audiovisual materials was available for researchers.
- No rooms were ready for viewing the materials.
- No film viewing/editing tables were available.
- No viewing copies were available; only the original copy existed.
- No policies existed for making copies available for use by academics.
- The collections were used for new productions only.
- The sales departments wanted the collections to be used for for-profit endeavors only.
- Audiovisual materials needed to be available for new transmissions at any given moment.
- No librarian was available to assist teachers in identifying materials to use in the classroom.

4. The year 2013

The site is Oslo. The year is 2013. The task and aim for my paper is to make a critical evaluation about the current situation for the target groups mentioned: academics, writers, journalists, students, and researchers—who all want to make use of the content of audiovisual archives for the work they do. Has there been any change or improvement in the working conditions for these groups? Has there been any improvement for students who want to study television programmes?

I forwarded a questionnaire containing information and questions about the aim of my paper to a select group of individuals with whom I had worked during the last thirteen years, as well as to a selected group of television companies and national archives and libraries.

5. The content of audiovisual collections—some issues

Some years ago, I worked with academics doing research in archives with sound recordings, radio programmes, and television programmes. Why is it important to include information from TV programmes and other film and recorded sound collections in academic research?

Let us focus on some important sources: photographs, sound recordings, and moving images.

Some photos are famous worldwide because they document political events, wars, or dramatic situations. In many cases, photographers who took these photographs were risking their lives to capture such moments and to make it possible for archives to maintain a historical record of the past—a risky business so to speak.

6. Too close to the source

Two people are to be remembered. Two war journalists who came too close to the source—Robert Capa and Marie Colvin.

6.1. Robert Capa

The famous combat photographer and photojournalist, Robert Capa, was born in 1913 and he died in 1954. His life is legendary. His photographic style was a dangerous business. Robert Capa made the famous statement about the quality of a photograph: “...if your photographs aren’t good enough, you’re not close enough...”

Robert Capa came too close to the object. He was killed by a landmine at Thai Binh in Vietnam in 1954. The camera does the talking was his attitude. Personal courage was more important than the techniques of the camera. Catching a dramatic moment was the challenge for Robert Capa.

He covered five different wars: the Spanish Civil War, the Second Sino-Japanese War, World War II, the 1948 Arab-Israeli War, and the First Indochina War. *Robert Capa: In Love and War* is an interesting documentary about the life and work of Robert Capa [the programme was transmitted by Swedish Television (SVT2) in 2004].

About 70,000 of his photographic negatives are preserved.

6.2. Marie Colvin

Marie Colvin was also too close to the source. Marie Colvin was born in 1956 and was killed on duty in Syria in 2012. She was an award-winning American journalist who worked for the British newspaper, *The Sunday Times*. Marie Colvin died while covering the siege of Homs in Syria. She produced documentaries, such as *Arafat: Behind the Myth*, and she is featured in the 2005 documentary film, *Bearing Witness*.

Marie Colvin covered conflicts in Chechnya, Kosovo, Sierra Leone, Zimbabwe, Sri Lanka, East Timor, as well as the Arab Spring in Tunisia, Egypt, and Libya. Her last mission was the Syrian Civil War where she was killed.

Marie Colvin was a legend. The Colvin family has established a memorial fund for Marie at the Long Island Community Foundation. The humanity of Marie Colvin's work is admired worldwide.

7. Two filmmakers and their attitudes towards archival footage

7.1. Philip Kaufman

The American filmmaker, director, producer, screenwriter, and actor, Philip Kaufman made a public statement about making use of archival footage in movies. The statement was published in an interview conducted by Ellen Engelstad in Sodankylä, Finland. The Norwegian newspaper, *Klassekampen*, published the interview on June 24, 2013.

“People are too eager in throwing away materials (films) wishing to create something new. The result is the fading of the authentic. I like archival footage because it is like stones you find on the beach and are cleaning in the water. The colours are emerging and you are wondering where they came from ...”

Philip Kaufman has adapted novels of different types in his movies, which include *The Unbearable Lightness of Being* (1988), written by Milan Kundera; *Rising Sun* (1993), by Michael Crichton; Tom Wolfe's heroic epic *The Right Stuff* (1983); and the erotic writings of Anais Nin, *Henry & June* (1990).

Archival footage was used in *The Unbearable Lightness of Being* to show the political environment in Prague in 1968.

Philip Kaufman directed the film *Hemingway & Gellhorn* (2013). The story is told with active use of archival footage, attempting to make the film a true story about the life of Ernest Hemingway and Martha Gellhorn. Archival film footage was used in a fascinating way where the actors appear to enter historical shots from the Spanish Civil War and other events. Footage for this film was selected from archives and libraries, including the University of South Carolina moving image research collections, the Imperial War Museum, Thought Equity, Getty Images, Producers Library, John E. Allan, Inc., HBO Archives, the Library of Congress, the U.S. National Archives and Records Administration, the Russian Archives of Documentary Films and Photography, the WPA Film Library, Macdonald & Associates, UCLA Film-Television Archive, as well as shots from the film *Spanish Earth* made by Joris Ivens.

The past, the future, and the present are nested through the use of archival film footage.

7.2. Ingmar Bergman

In many of his films, the late Swedish film director Ingmar Bergman comments on the role of the artist. In two of his films he uses archival footage: *Persona* and *A Passion*.

In his films, actors portray both reality and fantasy. Why, in these two films, does he replace actors with archival footage? Ingmar Bergman made this statement about the matter: “...political activity today is precipitated by the news, by television's immediate closeness to what is going on all over the world. In this respect art has missed the boat completely. Artists are hardly the social visionaries they used to be. And they mustn't imagine they are! Reality is

running away from artists and their political visions...”⁶²

The scene selected for the movie *Persona* is TV news footage of Vietnamese monks in Saigon burning themselves to death with gasoline. TV newsreels make the past as real as possible. No fiction. The stock footage for the film *A Passion* is the famous event in Vietnam where South Vietnamese National Police Chief, Nguyen Ngoc Loan, shoots a Vietcong in the head in the street of Saigon.

8. Movie industry—film history—historians

American historians have been worried about the influence of historical movies in schools in the U.S. One hundred movies were studied and evaluated. The results of the studies were published in a book, *Past Imperfect: History According to the Movies*.

A positive cooperation between historians and film directors does not always take place during the preparation for the production of historical films. Historians are not always a group from whom film directors seek advice while making a movie. While film companies may want to talk to historians about the film, the film director makes his own decision about the final content of the film even if the historians have a negative opinion of the film. The main concerns of the director are the economics of the film, not historical facts.

9. History studies, access to audiovisual archives, and the selection of sources

For years historians have paid little interest to using films and television programmes to highlight different political events or issues related to world events. The written word, the main decisions made by politicians at meetings, official reports, and documents, have been the main sources for the work done. Due to new possibilities for research, the negative attitude among historians has changed. It is important to include information about different social and political events by showing the recordings of the events captured by television reporters or journalists. The main problem for years has been the lack of access policies of the producing television and radio companies for letting university scholars get access to their historical broadcasts.

Even today some find the use of books as a tool and as a source to be better than viewing a film in a cinema or viewing the programme on television. It used to be complicated making notes while viewing films and television programmes. It was easier to read a book, make notes, turn to the first part of the book and then return to the last pages.

The use of videocassettes, DVDs, and modern file formats has made it possible to view programmes and at the same make critical studies of their contents. Researchers can start and stop the programme when they want to make notes or discuss the content with other scholars or students. These tools are good for studies. But you must first get access to the audiovisual archives.

The Norwegian professor Knut Kjeldstadli reflects on these issues in his book, *Fortida er ikke hva den en gang var: En innføring i historiefaget*. The book was first published in 1999; in 2005 a revised edition was released. The discussion about the importance of history studies and the use of sources is very interesting for all of us who have worked in the field of research and in the field of audiovisual archives.

To make people interested in history as a subject, historians have to communicate with ordinary people about the results of their efforts. Television programmes about historical events are popular. People watch dramas about the history of their nation and about wars and politi-

62 Bergman, Ingmar: 1993. Bergman on Bergman: interviews with Ingmar Bergman by Stig Björkman, Torsten Manns, Jonas Sima. New York: Da Capo Press.

cians. Even if the producer states that the story is a mixture of facts and fiction, many viewers believe in the stories as true historical reports.

The content of audiovisual archives brings researchers closer to the historical event than a written document or an official report or a published book.

Those who make documentary recordings live a dangerous life. In 2012 approximately 141 journalists were reported killed on duty. Robert Capa and Marie Colvin are two important people who should be remembered for such documentary work.

The driving force behind the use of audiovisual sources for research is the need for dependable primary documentation. Like the statements of the American combat photographer, Robert Capa, the historian needs to come as close as possible to the past. Films, photos, and sound recordings are documentary forms that make research of the past as close as possible to actually being in the past. It is true, however, that footage of historical events may be edited by a producer to create a story by and for the producer in which a new reality is created to satisfy the aim of the programme. A scholar must evaluate historical footage with reference to facts already known. Even in films, you will find the need for the use of additional facts in order to help viewers understand the subject. Some movies make use of facts listed at the end to tell why the story ended like it did or why the characters behaved the way they did. For instance, at the end of the well-known movie *Y Tu Mama Tambien* the viewers are informed that the woman who is travelling in Mexico with two young boys has cancer and that she has to face the fact that she is dying.

Professor Knut Kjeldstadli wrote about the issues of using audiovisual archives, but he did not approach the practical problems of getting access to audiovisual collections.

10. Experiences working with academics, writers, students, and television producers

You have to come close to the sources when you are working with the groups mentioned. You get a feeling that you take part in an important work making an official report about a certain subject. The aim of the work has to be defined at an early stage of the work. The life of the researcher is not the same anymore. If the audiovisual collection has been digitized, it is an easy task to find the shots or the sound recordings. The challenge is to get access to footage that has not been digitized. Even then, it is not a question of getting access, but of what you get access to? An organization can give you permission to search the archive by yourself if you know what you want. Access to an archive can be given to you as an official policy of an organization because the content is of value to all of us. But what about all the programmes that were transmitted and later wiped out and deleted?

11. Selection—deleting archival footage—the content of the archives

In 1993, the Norwegian historian Henrik G. Bastiansen was working on a project about the Apollo moon landing and the broadcasts of the event. The report was presented at the international conference of FIAT/IFTA in Sofia, Bulgaria in September of that year.

“It was a shock for me as a historian to find out that every record of the live broadcast from the studio in Oslo was destroyed and lost forever! ... The only parts of the whole broadcast that are preserved today, are the interviews with the Norwegian artists and experts that were done on 16 mm film in advance... Many recordings of the Norwegian live broadcast were videotaped, but were later deleted from the videotapes. Why?”

Bastiansen was awarded his doctorate at the University of Oslo in 2006 with his thesis, “*Da avisene møtte TV: Partipresse, politikken og fjernsynet, 1960–1972*” (When the newspapers

met TV: Party press, politics, and television, 1960–1972). He has published books about topics such as freedom of speech in Norway, the Norwegian press, the Norwegian Broadcasting Corporation, and general media history.

Bastiansen was not the only one who was shocked by the reality of using archival footage as a primary resource. Many of those who were in charge of the productions transmitted worldwide were worried about the absence of preservation policies in the television companies. I was worried too. I disliked the situation of deleting historical facts and sources.

12. Avoid the void— a struggle for decency—a journey from a soviet asylum to a forgotten paradise

The Norwegian scholar, Gunnar Gjengset, wrote a book about his escalating experiences with alcohol abuse due to a posttraumatic stress disorder (PTSD) after having been sentenced to one year in a labour camp in the Soviet Union in 1970. As a young student, Gjengset went to the Soviet Union to take action against violations of human rights involving Yoli Galanskov and Pjotr Grigorenko. Gjengset was released from the labour camp only as a result of international pressure.

Making use of audiovisual archives was important for Gjengset's writing. Some years ago he approached me, searching for films made in connection with a television production in Norway. He had abandoned his search due to too many regulations and formal obstacles. So I assisted him in the search, and led him to films of which I was aware. And he managed to do his work. The experience of approaching a television company for a single academic researcher, such as Gunnar Gjengset, was not a positive experience. Therefore, this summer, I spoke with him about his efforts to make contacts with different archives. The National Archive of Norway did a good job for him. But he still remembers the negative answer from television companies some years ago when he was busy writing a lecture and wanted to make use of new sources.

Gunnar Gjengset has a Ph.D. from the University of Umeå in Sweden. He has written a book about the Norwegian sculptor Gustav Vigeland and the writer Matti Aikio. He is a highly respected and satirical aphorist who has had his own columns in leading Norwegian newspapers for more than 20 years.

13. The responsibility to support academics and their use of collections in audiovisual archives: television corporations and national archives

Television companies are production units making new programmes every year for transmission, like a publishing company where the goal is the production and the publication of books. National archives and libraries are set up to support education and research and to steward the cultural heritage of a nation. The demand for production is not the main aim of these archives and libraries.

Students working to finish a Master's degree or a doctorate must evaluate the sources available. If audiovisual resources are on their list of sources, students will most likely face a problem getting access to them. The main reason for this problem is the official policy of these two mentioned bodies: television companies and national archives and libraries.

The researchers also face a technical problem in asking to view the archival footage.

14. The turtle revolution—a slow but important change in technology

About thirteen years ago we talked about a new technical change in making television programmes and radio programmes available. We also discussed transmission possibilities and preservation policies for old movies, TV programmes, and archival footage. The resistance towards assisting scholars in their research had to change—we all were of the opinion that the revolution would come, even if slowly.

In academics there is a traditional approach to research. The written document was traditionally more important. Document archives were a need for all scholars.

15. Military history—selected sources

The year is 2013 and I decided to conduct an experiment myself to study the list of sources printed in approximately fifty books published over the last thirteen years. The subject: military history.

My assumptions were pessimistic. I assumed that military historians are a conservative group of people who do not want to use new sources available on the Internet or stored in audiovisual archives. I was right. I found only five books where the historian had used movies, documentaries on film, radio programmes, or sound recordings.

16. Bjørn Fontander in Oslo—the Norwegian Broadcasting Corporation (NRK)

The year is 1979. The Swedish television producer, Bjørn Fontander, was making a documentary about Norwegian refugees during the Second World War. The Norwegian title for the programmes is *På flukt over Kjølen*. Four programmes were made. They were all transmitted in Norway in 1979. Later, I was informed that Bjørn Fontander also had written a book based on the programmes. The title of the book is *Flukten over Kjølen*.

My research on the sources used by military historians led me to an interesting book about Norwegian soldiers in Sweden during World War II written in 2008 by Anders Johansson, *Den glemte arme: I skyggen av hjemmefronten*.

I was surprised to find the book written by Bjørn Fontander on the list of sources and not the four television programmes produced by Swedish Television in 1979.

17. Conservative academics?

Is my assumption correct that the writers of history books are too conservative in their selection of sources? I hope I am wrong. I found information with reference to audiovisual archives in only five books. Radio programmes, video programmes, or old movies were not highlighted among the sources.

The test might provide a warning that we have not yet reached the level where we can claim a revolutionary change regarding the use of digitized materials among academics and writers of history.

18. Access to audiovisual archives after thirteen years—any changes?

The site is Mexico City. I am taking part in an international conference presenting a paper on audiovisual archives—past and future. The year is 2003. I made a statement about the future: no tapes, no films, and no sound recordings. The invisible collections have been revealed by the digitization of the archives. No tapes and no films and no sounds.

To a certain extent the statement is a good one, but only to a certain extent. If we today approach some of the most important national libraries and archives, film institutes, and national television and radio corporations worldwide, the official policy is to digitize collections so that researchers can be given an opportunity to access these materials making use of the flexibility of digital files and networks.

The negative attitude the academics experienced thirteen years ago is gone and is now only history.

Due to the digitization of collections, the official policy towards academics is now a positive one. A change from 2000 to 2013 has taken place for the benefit of researchers.

The reading room is now the researchers' office where they can view the materials they seek. This is possible today at many institutions. I have tested some of the most important institutions searching for archival footage and programmes. The work is easy. You can get easy access to many interesting programmes. The main problem now is not the already digitized material but the materials left undigitized in the archives.

The issue is the content of the archives. What do we mean when we say the archive is an audiovisual archive? The next question: has a national legal deposit law been introduced? Are transmitted radio and television programmes stored in the archive? Music and books and written documents, too?

Researchers who want to view old programmes made on film and not copied to a new format, have to view the film on a film-viewing table. What about old two-inch tapes? This is a different kind of problem. The machines made for the production and the use of two-inch tapes are almost extinct. These tapes have to be transferred to a digital file or a new tape format. This means that the researcher has to pay the archive a visit to get the work done. The researcher has to have a budget for the work. Universities must set up budgets for viewing legacy materials.

19. Response to a selected questionnaire about access to audiovisual archives for academics: Television Nacional de Chile (TVN)

The city is Santiago, Chile. The head of the Documentation Center of Television Nacional de Chile granted me permission to publish her response to my survey. Her name is Amira Arratia Fernandez. She is the official FIAT/IFTA representative for Latin America. She was educated in librarianship at the University of Chile in Santiago. Since 1973 she has worked at TVN. She joined FIAT/IFTA in 1979. Amira Arratia Fernandez is on the right in this photo taken during a press conference in Mexico City in 2001 (Figure 1).



Figure 1. Amira Arratia Fernandez (right). Photo taken during a press conference in Mexico City in 2001. Also pictured, from left to right, Perla Olivia Rodriguez Resendiz from Radio Educacion, Tedd Urnes (formerly Johansen) from Norwegian Broadcasting Corporation (NRK), and Lidia Camacho Camacho from Radio Educacion.

The Documentation Center of TVN has a huge audiovisual archive that dates back to 1969 and includes 16mm film, two-inch and one-inch video, ¾ inch U-matic, Beta SP, DigiBeta, optical discs, and now born-digital video. Access to audiovisual materials for TVN's users is free and available on all formats, new and old. Independent producers, students, researchers, historians, and the general public have access to the archive. Depending on the use that the researcher

intends to make with the materials, there may be a cost. According to TVN compliance with the Legal Deposit Law, they send a hard drive once a month to the National Library with all programming broadcast by TVN. Any Chilean who requires access to TVN material can consult the contents in the reading room at the National Library. They cannot take copies of the materials; they can only view them onsite. Actually TVN is working on a special project, to be finished in 2014, to put programs and news materials on the Internet in order to allow free access to external users. It is important to highlight the work that TVN has done with audiovisual materials towards the historical recovery of Chile in the period when the country was under the military dictatorship. The contribution of TVN's archives has been invaluable. When TVN ceased to belong to the state and became public television in 1992, a series of reports were conducted. The written reports described how human rights were violated in Chile during the dictatorship of General Augusto Pinochet. TVN collected moving images, some which had been hidden for years, and armed reconstruction programs with real documentation of Chile's history. These programs had a tremendous impact on the general public. TVN as a public broadcaster felt the right to contribute to this effort with audiovisual material and to make it available to the public now that it is no longer necessary to hide programs from a military dictatorship that sought to erase historical footage, to burn it, to erase the history of Chile.

This is the report from Amira Arratia Fernandez, Television Nacional de Chile.

20. Recommendations—national libraries and archives

On the national level, if one does not already exist, it is important that the government introduces a legal deposit law for all broadcast materials. The responsibility for the future care of national audiovisual patrimony must be supported by a country's national library or archive. Preserving programmes without creating digital surrogates of the programmes is a policy that this author does not recommend.

21. Recommendations—universities, students, and academics

Professors at universities must take an active role in making it possible for students to get access to audiovisual archives. A budget is a must for those students who want to view old materials not yet digitalized but kept as originals in the archives.

Researchers are too conservative in the selection of sources for studies. The written work is still the most commonly used source. In the future, I want to see on the list of sources for a published book an equal presentation of selected books, radio and television programmes, and movies.

No tapes, no films, no sound recordings? What to do with the original materials and the original machines for the materials? The responsibility is on the shoulders of the national libraries and archives—do not put all trust in the radio and television companies.

THE INVISIBLE SOUND: A STUDY IN THE TRAJECTORIES OF SOUND PRACTICE IN INDIAN FILMS BY ONLINE ARCHIVAL RESEARCH

Budhaditya Chattopadhyay (University of Copenhagen, Copenhagen, Denmark)

1. Introduction

In recent years, digital media technologies have had a significant impact on cinema particularly in the production and reproduction formats of cinematic sound. Techniques and practices such as 'sync' recording and multichannel sound design alter the typical organization of a film soundtrack. At reception-end, these phenomena initiate reconfiguration of audience engagement, thereby contrasting with earlier cinema viewing in the mono-aural and stereophonic settings to shift from the earlier construct of a linear 'soundtrack' toward a complex multi-layered digital sound environment. For example, in recent Indian films, the previous practices of the mono-aural and stereophonic mixing of dubbing, stock-sound effects, and studio Foley are gradually being replaced by 'sync' sound effects and an elaborate design of location-specific ambience alongside actors' 'live recorded' performance (Chattopadhyay, 2013). These authentic sound elements incorporate a wider proliferation and diffusion of sonic artifacts into cinematic narrative, adding depth, texture, and perspective and instigating a creative and inventive use of sound. I argue that, in this creative realm of digital cinema, reordering of the multiple layers of sound aims to evoke the audience's spatial association and cognition of cinematic location similar to the working of the sound-based arts. These practices restructure Michel Chion's notion of cinematic sound as an audiovisual contract of merely vococentric order (Chion, 1994), which was applicable to the earlier practices, i.e., mono-aural and stereophonic sound in Indian cinema. Therefore, these different trajectories of sound practice require thorough investigation to articulate the shifts with a historical approach based on in-depth archival research, which is the main concern of this project.

2. Project description

In his new book *Film, a Sound Art* (2009), film sound theorist Michel Chion argues that watching movies is more than just a visual exercise: it enacts a process of audio-viewing; the audiovisual makes use of a wealth of tropes, devices, techniques, and effects that convert multiple sensations into image and sound, therefore rendering, instead of reproducing, the world through cinema. He develops these convergence-hypotheses that recast the history of cinema as the evolution of a truly audiovisual language. If we employ these hypotheses on the Indian mainstream cinema conditions as case studies, we will discover that Indian sound-films since *Alam Ara* (Irani, 1931) seldom pertain to the 'audiovisual' language as perceived by Chion. Rather these earlier films have undermined the aesthetic dissemination of sound by an overwhelming usage of song and dance sequences where creative applications of sounds have sparsely been used. However, the advent of digital technologies alters the way Indian cinema has been constructed so far. With the introduction of digital technology in film-sound newer audio aesthetics appeared. Easily available and easy-to-handle recording devices and design tools have brought in fresh angles and varied forms in film-sound practice, such as location 'sync' recording and surround sound, which transform production and reception of recent Indian films if we conduct an archival study through these trajectories with an historical approach. Following this, we can observe that, the contemporary construct of mainstream cinematic sound is different from the pre-nineties films, with multiple layers of sound enabling the audience to connect his/her sonic experience by the way it conveys information and emotive qualities related to lived-experience of the phenomenal world (Bordwell, 2009), similar to the working of sound-based artworks such as soundscape composition (Schafer, 1977; Drever, 2002), emphasizing the creative use of sound in cinema.

My Ph.D. project intends to comprehend these historical trajectories in the practice of sound in Indian cinema. The intention of the project has been to develop theoretical models that articulate emergent aesthetics in cinematic sound formulated by different historical phases of sound practice, such as direct optical recording, magnetic studio recording and stereophonic effects, locational 'sync' recording, surround sound, and other spatial audio effects, arguing that

throughout the historical development of cinematic sound these practices have gradually re-configured spatial, temporal, and cognitive audience engagement in an interactive context unlike earlier cinema of mono or stereophonic settings. In the project, an outline is provided for the observation and analysis of the different trajectories of sound practice in Indian cinema, arguing that the audience engagement with the moving image is increasingly instigated by spatial reordering of sound instead of maintaining a merely vococentric audiovisual contract. In the analysis, the focus has been on the strategy of using the location-specific environmental sounds or ambience assuming that in the digital realm of cinema they provide for sonic artifacts in the cinematic narrative having a tendency to develop a 'post-cinematic' soundscape, which is principally crafted through digital techniques and practices like 'sync' recording and multi-track surround sound design that emphasizes elaborately creative and inventive use of sound in cinema via the intricate spatialization of these sound layers. Here, the term 'Soundscape' is referring to R. Murray Schafer's notion relating to the mediation and aesthetic dissemination of environmental sound (Schafer, 1977) as aptly put by John Drever in his paper 'Soundscape composition: the convergence of ethnography and acousmatic music' describing soundscape as a juxtaposition of ethnography and artistic practice incorporating environmental sound as basic ingredients (Drever, 2002). By accessing, retrieving, studying and analyzing a number of sound-films from different technological phases of direct recording, magnetic recording, and present-day digital recording, the article proposes three corresponding models that are developed on the basis of observations. These models take their point of departure in specific phases of technological transitions and intend to highlight characteristics defining the sound aesthetics that emerge from these different phases of sound practice. The argument developed following the observations is that, through different phases of cinematic sound practice, the relationship between audio and visual has shifted from a merely vococentric contract to a creative realm of sound, in which audience engagement with the moving image is increasingly instigated by spatial reordering of environmental sound or ambience that essentially reconfigure the linear construct of a film 'soundtrack' toward a spatially-evocative surround sound environment, which is crafted by artistic application of digital technologies on cinematic sound such as 'sync' recording and multi-track sound design highlighting a cognitive theoretical premise in cinematic sound studies.

3. Methodology and approach

The methodology of the project has been to conduct an intensive archival research and analysis of a number of film soundtracks from the optical era, the electro-magnetic era and the contemporary digital era retrieved from the film archives. The approach has been to experience, examine, and analyze a number of these representative soundtracks accessed and retrieved from the archival film materials representing different technological phases, such as direct optical recording and mono-aural mixing, magnetic recording and stereophonic effects, digital 'sync' recording, surround sound and other digital audio effects by an in-depth and intensive archival research and by engaging with these materials as significant historical sound/audiovisual contents for analysis. For the empirical phase of the research, a substantial amount of the archival materials are examined and an extensive fieldwork interviewing film personnel such as sound designers, location recordists, production mixers, and sound editors has been taken up. This part of the project is done in collaboration with a number of film archives and institutions devoted to preserving Indian cinema.

4. Problem

The problem faced during the initial phase of the archival research is of accessing physical contents and dealing with the question of openness in relation to the institutionalized archives in India. The main issue has been red tape in bureaucracy and intervention/mediation in the mode of access. Indian film and audiovisual archives, mostly the institutional ones are still relying on older forms of preservation and storage rather than the free mobility of source materials (Chattopadhyay, 2009) available to new technologies. There are discourses on copyright and from a point of view of regulatory ethics data should carry the name of the source and data cannot be copied/curated/reused without the permission of the author. In the Indian context

this regulatory ethic looms large and archives act as mere repositories of the recordings without a proper plan for access and use (Chaudhuri and Seeger, 2004).

5. Solution

Instead of being sought from physical archives, the archival materials are accessed and retrieved primarily from online resources addressing the question of openness and usage of new technologies. A large amount of archival material has also been sought through Internet repositories via video hosting sites such as YouTube, Dailymotion, and Veoh. The user-generated link-sharing websites that catalogue links to TV shows, films, and music videos, such as Alluc.org, have also been explored.

The openness of these new media platforms initiates accommodating older media in a digitized form and spreads it within the public domain of the users of these new technologies. New media is not simply a linear extension of the old, rather a different discourse suggesting an apparently democratic pattern by means of open source architecture of data. From the point of view of archiving, old and new media both offer preservation of and access to information resources to larger audiences; the difference is that new media can expand the range of resources to new dimensions; they can provide open access to the resources, larger mobility of archival content, reinterpretation of older forms, and interactive links between users. These capacities of new media enable a decentralized repository like an invisible but openly available archive allowing users to choose what information they want and in what form in a transparent openness. In the light of new technologies, seemingly forgotten moments in the history of film sound can be rediscovered and used for research.

6. Findings

Web-based streaming services such as YouTube, Dailymotion, and Veoh host a stupendous amount of Indian films, from as early as silent era to the present day. Most of these repositories presently enjoy a rapid growth in open and free access and user interaction as shown below in Figures 1–3:

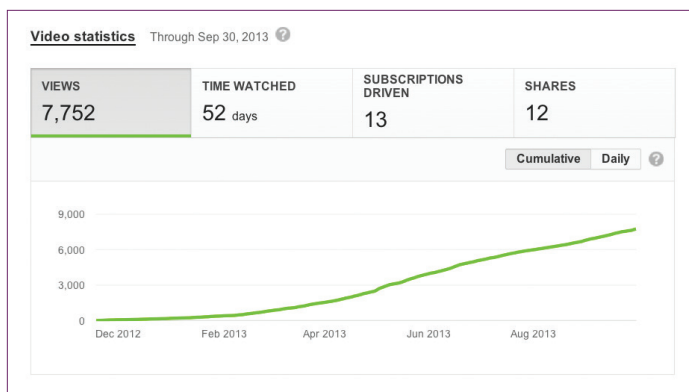


Figure 1. Statistics of online viewing of the film 'The Philosopher's Stone' (Satyajit Ray, 1958), courtesy YouTube.

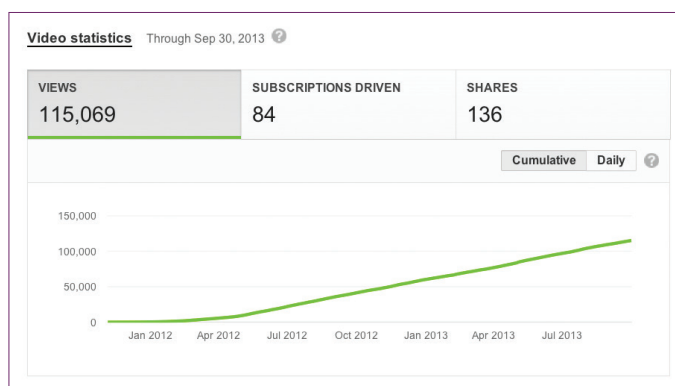


Figure 2. Statistics of online viewing of the film 'The Hero' (Satyajit Ray, 1966), courtesy YouTube.

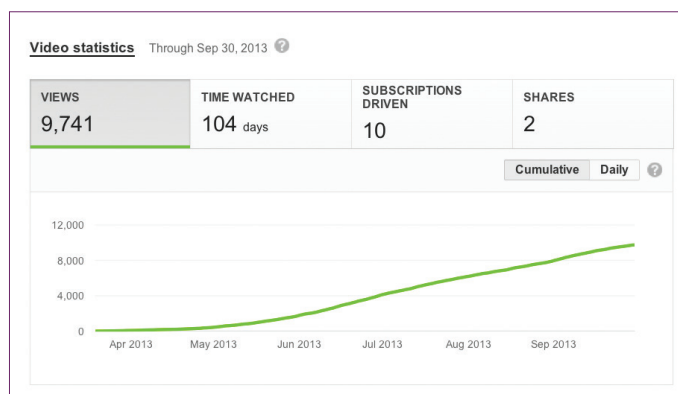


Figure 3. Statistics of online viewing of the film 'The Enemy of the People' (Satyajit Ray, 1989), courtesy YouTube.

7. Conclusions

Watching a film and listening to its soundtrack from web streaming is now a usual practice in the afterglow of the digital era. The potential pleasure in listening to the open source online archives by headphone is achieved by immersion in sound. Sound scholars like Michael Bull have already discussed about the ramifications of the rampant usage of headphones in the so-called 'iPod culture', while more recent works in this area such as by Anahid Kassabian have explored the phenomenon of 'distributed subjectivity' by 'ubiquitous listening' in smaller digital platforms. What is at stake here is the essential miniaturization of media devices and their increasing strength in distributing and handling the big data of online archives. When we come to sound and listening in that context, we face the dichotomy of listening practices of more complex digital multi-track and layered sound mixes of feature film sounds in a relatively limiting dynamic range of online streaming media. The central question here is how do sound producers adapt their creativity in relation to the open and volatile platforms of web-based film and audiovisual archives (such as the ones I am exploring), and how do potential audiences/media users access these domains. I have found during the current phase of my archival research that the methodology to open and free access to archival contents available to the media user on the web lead to deeper 'personalization' of sound. Here I consider 'personalization' as a cognitive process involving selfhood, subjective contemplation, and presence within an auditory situation of essentially personal nature. I would like to call this 'Post-cinematic Sound,' meaning that the intended purpose of an increasingly artistic, innovative, and spatially layered and densely constructed digital sound when experienced in relatively lower dynamic ranges of web stream-

ing via headphones, leads to remediation toward the personal and the subjective ramification of sound. In the contemporary world of open source access in the pervasive media archives, digital sounds and our relationship to listening demand to be understood in a new discourse based on the historical developments, but leading toward the contemporary post-digital realm of freer access and openness. This project contributes to that emerging discourse.

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Jörg Houpert

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Germany
Tel. +49 421 20144 0
Fax +49 421 20144 948
e-mail: j.houpert@cube-tec.com
<http://www.cube-tec.com/>



Paul Leitner

Eichetwaldstraße 6
A-5081 Anif Salzburg
Austria
Tel. +43 660 5553155
e-mail: paul.leitner@mediaservices.at
<http://www.audioinspector.com/>



Jean Christophe Kummer

VertriebsgesmbH
Johannagasse 42
A-1050 Vienna
Austria
Tel. +43 1 545 2700
Fax +43 1 545 2700-14
e-mail: c.kummer@noa-audio.com
<http://www.noa-audio.com/>

JVC Advanced Media EUROPE GmbH

att. Hiroko Ito
Nording 23
90765 Fuerth
Germany
e-mail: hiroko.ito@jam-eu.com

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Webmanager: **Richard Ranft**, Head of Sound & Vision,
The British Library, 96 Euston Road,
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