Tracking the reel world

Nothing is built on stone; all is built on sand, but we must build as if the sand were stone.

Jorge Luis Borges

Tracking the reel world

A survey of audiovisual collections in Europe

Edwin Klijn and Yola de Lusenet

European Commission on Preservation and Access, 2008


Culture 2000

This report is published in the framework of TAPE (Training for Audiovisual Preservation in Europe), a project funded under the Culture 2000 Programme of the European Union, running from 2004 to 2008.

The five partners of TAPE are:
European Commission on Preservation and Access, Amsterdam
Finnish Jazz and Pop Archive, Helsinki
Head Office of State Archives in Poland, Warsaw
Phonogrammarchiv, Austrian Academy of Sciences, Vienna
Reproduction, Binding and Restoration Centre for the State Archives of Italy, Rome

All URLs in this report were accessed in January 2008.

Published by the European Commission on Preservation and Access, Amsterdam, www.knaw.nl/ecpa, ecpa@bureau.knaw.nl
January 2008
ISBN 978-90-6984-546-3
Available as pdf at www.tape-online.net/docs/tracking_the_reel_world.pdf

The paper in this publication meets the minimal requirements of the American National Standard for Information Sciences – Permanence of Paper for Printed Library Materials ANSI Z.39.48-1992

Photographs: Yola de Lusenet, ECPA
Typesetting and design: Ellen Bouma, Alkmaar

Preface and acknowledgements

This report has been long in the making. When we started the TAPE project, the survey on audiovisual collections in Europe was the first thing on our list. Now we are closing TAPE with the publication of this report.

There are many reasons why we needed so much time, but the most relevant is that we had an unexpected stream of responses to the questionnaire. Almost 400 responses is quite a lot for this kind of survey, and they came to us from all corners of Europe. Well into 2006 the TAPE partners still kept collecting responses in their own countries, and in the end we had to deal with many more data than we could ever have hoped for. But the consequences were that the analysis took considerable effort, the calculations taxed the database we had built, and the complexity of the data invited us to pursue endless potential correlations and also, naturally, led to many dead ends.

This report is full of figures and data, but they are there to support a story, an analysis of trends and directions. This analysis comes not just from making the calculations and studying the figures, it also comes from the documentation people sent us, the websites of respondents, the comments they volunteered, the reports they copied for us, and the many contacts we had in the course of the TAPE project. Studying the individual questionnaires and the accompanying materials, we caught a glimpse of the concerns and ambitions of our respondents. Some sent in their answers in the hope that their contribution might help to change things, others apparently in despair. We met collection managers who bravely do what they can, as well as those who do not know where to start, in the face of uncertainty and limited resources. We saw archivists struggling with materials flooding into their institutions, as well as researchers personally guarding a box with a couple of recordings of a near-extinct language.

Making our way through everything we were sent, we most of all felt the presence of hundreds of people who care, sometimes passionately, about the materials they feel responsible for. This is stuff that matters to people. No figures or graphs can express this, but it is the most important finding of our years of working on this report. And because we felt that these voices should be heard, whenever we had an opportunity, we quoted the words of our respondents in the text. We hope that this will bring the story to life and give readers a sense of connection with the real world that lies behind.

Many people contributed to this report, directly or indirectly. Our thanks are first of all due to our respondents, whom we cannot name as we promised not to do so. Our TAPE partners all actively collected data, translated the questionnaires and the responses, and helped by answering questions and reviewing the texts. We learned a lot from them about audiovisual life in their countries, about technical issues, and about audiovisual archiving in general. To those who received us on our working visits we are grateful for the time they took to show us around and talk with us about their collections and their work. The wider circle of colleagues who attended the TAPE meetings, helped to organize training courses, or involved us in their activities, we would like to thank for their help in various ways, be it translating, reviewing, sharing ideas or discussing issues that were relevant for our research. Here we should mention two people specifically: Anne Muller and Paula Witkamp, for many years the best colleagues anyone could wish for, who did an enormous amount of work and were generally pillars of strength even when the going was rough.

All of them helped to bring about this report, but none of them can be blamed for any errors that the authors may have made.

We are also grateful to the Netherlands National Commission for UNESCO for the many ways in which they supported our work on the survey, and for their patience. The Royal Netherlands Academy of Arts and Sciences, for many years the home of the ECPA, made it possible for us to undertake the project

This report was written to bring about action, for action is desperately needed. It is up to others to take that action, for TAPE will have finished by the time this report is published. We hope that the TAPE project has set some things in motion, and that the publication of this report will give a new impetus to activities to keep the audiovisual heritage of Europe alive. A whole world of sound and images is still waiting to be explored.

Edwin Klijn
Yola de Lusenet
January 2008

The authors would like to thank:

Nadezhda Brakker, Centre on the Problems of Informatisation of Culture of the Ministry of Culture of Russia (Centre PIC) ● Paolo Buonora, State Archives of Rome ● Luisa Casella ● Anna Czajka, Head Office of State Archives in Poland ● Kurt Deggeler, Memoriav ● Beth Delaney, Netherlands Institute for Sound and Vision ● Gigliola Fioravanti, Reproduction, Binding and Restoration Centre for the State Archives of Italy ● Giovanna Fossati, Netherlands Filmmuseum ● Jean-Marc Fontaine, Laboratoire d'Acoustique Musicale, Université Paris Pierre et Marie Curie – MCC – CNRS ● Ton Goeman, Meertens Instituut, Amsterdam (DIVA-AVA) ● Tjeerd de Graaf, Frisian Academy ● Kees Grijpink, Meertens Instituut, Amsterdam ● Albrecht Haefner, IASA German-Swissgerman Branch ● Jean Hellwig, Foundation Vista Far Reaching Visuals, Amsterdam ● Juha Henriksson, Finnish Jazz and Pop Archive ● Brigit Hoomans, Netherlands Institute for Sound and Vision ● Map Huiskamp, Gelders Archief, Arnhem ● David Iglésias Franch, Centre de Recerca i Difusió de la Imatge (CRDI), Girona ● Martin Jacobson, Swedish National Archive of Recorded Sound and Moving Images ● Crispin Jewitt, British Library Sound Archive ● Annemieke de Jong, Netherlands Institute for Sound and Vision ● Frank de Jong, International Institute of Social History ● Roland de Jong, Historisch Centrum Overijssel, Zwolle ● Gerrit Knaap, Royal Netherlands Institute of Southeast Asian and Caribbean Studies (KITLV), Leiden ● Martin Koerber, Deutsche Kinemathek – Museum für Film und Fernsehen ● Ella Kok-Majewska, Regionaal Archief Rivierenland, Tiel ● Fred de Kok, Netherlands Institute for Sound and Vision ● Karin Leers, Rijckheyt, centrum voor regionale geschiedenis, Heerlen ● Christian Liebl, Phonogrammarchiv Austrian Academy of Sciences ● Jo Linden, DSM, Heerlen ● Frank van der Maden, Brabant-Collection, Tilburg University ● François-Olivier Manson ● Michel Merten, Memnon Audio Archiving Services, Brussels ● Tatyana Moisseenko, Leiden ● Franz Pavuza, Phonogrammarchiv Austrian Academy of Sciences ● Mare Purde, Estonian Film Archives ● Hilary Roberts, Imperial War Museum ● Harry Romijn, RHC Groninger Archieven ● Elif Rongen-Kaynakci, Netherlands Filmmuseum ● Wim Rosema, National Museum of Ethnology, Leiden ● Dietrich Schüller, Phonogrammarchiv Austrian Academy of Sciences ● Jantje Steenhuis, Rotterdam Municipal Archives ● Asbjørn Inge Straumfors, National Library of Norway ● Jacob Trock, Danish Film Institute ● Matthias Vandermaesen, Stadsarchief Antwerpen ● Obby Veenstra, Fries Film Archief ● Nadja Wallaszkovits, Phonogrammarchiv Austrian Academy of Sciences ● David Walsh, Imperial War Museum ● Karin Westerink, Netherlands Institute for Sound and Vision ● Vincent Wintermans, Netherlands National Commission for UNESCO ● Richard Wright, BBC Future Media & Technology

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Summary and conclusions

a lot of materials, many different organizations

This report on audiovisual collections in Europe was written in the framework of TAPE (Training for Audiovisual Preservation in Europe), on the basis of desk research, working visits, and data from 374 organizations from 34 European countries that participated in a survey. Of the respondents in the survey, most are archives (almost 40%), followed by libraries (22%) and museums (11%). The rest of the respondents are (research) institutes, broadcasters, private collectors, and commercial companies. A quarter of respondents are specialist audiovisual organizations, the others have mixed-media collections, in which audiovisual materials are a minority collection.

Of the 0.9 million hrs of film, 9,4 million hrs of audio, and 10,5 million hrs of video that the respondents in the survey quantify, the major share is concentrated in a handful of extremely large collections (national audiovisual archives, broadcasters, deposit libraries). The focus of this report is on the mixed-media collections in non-specialist institutions. The unexpectedly high number of responses to this survey is an indication of the awareness among professionals that these collections deserve more attention. The survey shows the wide variety of organizations that collect audiovisual materials and the rich diversity of their contents.

small but significant collections

Many of these collections are small or very small: 65% of film and around 40% of audio and video collections consist of no more than 500 hrs. But if they are small, they still represent significant value. For instance, about half of the respondents outside broadcasting have made their own audio recordings, and on average these recordings, which are very often unique, constitute 20% of their audio holdings. Audiovisual collections in public institutions are also important for bringing together materials which are related in terms of content. When the originals, as is often the case, are owned by broadcasters and production companies and therefore not openly accessible, these public collections provide the only point of entry for consultation.

growing collections, growing problems

The average increase per year is expected to be 1-2% for film and audio, but approaching 6% for video. Whereas for broadcasters and deposit collections the stream of new materials may for a large part be digital, for archives that receive

materials years after they were first produced a lot of the influx can be expected to be on analogue carriers. Problems of obsolescence can therefore be expected to increase before they can be solved.

lack of basic data

The estimates of amounts of media and carriers in this report are conservative and do not extrapolate for the substantial number of respondents who do not provide any information at all on the size of their collections; this concerns almost a third of the respondents with film and more than 10% of the audio and video respondents. At the level of specific carriers, the number of responses decreases further: for instance, of the respondents with video materials, only 70% give an estimate for the amount that they hold of different formats. When it comes to condition of materials, many of those who state they do have certain audio and video carriers subsequently do not give assessments of their condition and explicitly state the condition is 'unknown'. It is worrying that apparently so much essential information is lacking that should be the basis for plans for long-term management.

condition

Of all the assessments of condition, in about 13% of cases carriers are deteriorating. For video most problems are observed with VHS and U-matic. Nitrate film is still known to be present in a good number of collections (in some cases stored without climate control) and vinegar syndrome is mentioned relatively frequently, although it also appears that not all respondents are familiar with these well-documented types of deterioration. With audio, deterioration most often affects open reel tape and compact cassettes. The strong presence of audiocassettes, which particularly research institutes find to be deteriorating in large quantities, is a striking finding. In earlier research, usually based on data from broadcasters and national audiovisual archives, the emphasis was on the risk to professional open reel formats. This survey shows that in mixed collections non-professional formats abound, of which several are subject to rapid decay.

many obstacles

The main issues hampering effective management discussed in this report are: lack of expertise, of adequate storage (both for analogue and for digitized materials), and of playback equipment, backlogs in cataloguing, and uncertainty about digitization. The small collections in mixed-media institutions are particularly vulnerable, as these institutions often do not have the resources to provide the specialist care that they need.

expertise and training

Lack of qualified staff is one of the main problems for smaller collections: around 70% of respondents with mixed collections of 5,000 hrs or less indicate they have no staff professionally trained for working with audiovisual collections. Even a substantial number of larger specialist institutions do not have staff that have been specially trained. Managing audiovisual media requires several competencies, and the opportunities to acquire these through formal education or continued training are limited: no more than 20% of respondents find there are sufficient training opportunities in their country. Many do not belong to an association for audiovisual professionals either and hence lack the support of colleagues involved in the field.

storage

Of respondents with collections of 5,000 hrs or less, half do not have climate-controlled storage for their film and tape, even though it is well known that fluctuating temperatures and humidity adversely affect their life expectancy. Even in specialist audiovisual institutions with larger collections, 25% do not have climate control. The combination of suboptimal storage, limited insight into the condition of audiovisual carriers, and lack of qualified staff that is found in many non-specialist institutions raises serious doubts about the chances of their survival.

cataloguing

The fact that there are serious gaps in the information on audiovisual holdings is related to what respondents consider the most urgent issue: incomplete or inadequate cataloguing. Around 40% of respondents report cataloguing backlogs, and on average this concerns a third of their collections. What is catalogued they often consider not to be described in sufficient detail. Now that materials are beginning to be digitized, the need to create extensive metadata is becoming even more pressing. For heritage institutions the level of description that broadcasters aim at for optimal exploitation of their digital audiovisual collections may well prove a fata morgana. With the wide range of descriptive models in use they can hope for interoperability, to be achieved by the adoption of common exchange standards.

playback equipment and creating new media

Especially in smaller collections, playback equipment is often absent or not in working order. The range of different carriers makes it difficult for all but the largest institutions to have well-functioning equipment for everything in their care, and even major audiovisual archives report problems with maintenance. This creates an immediate problem for access and use, but also complicates long-term management.

There is wide consensus that digitization will be the escape route for materials locked in obsolete formats, but in order to extract the signal from analogue materials they will have to be played back at least one more time, on the right equipment. Without functioning playback machines, the transfer to the digital domain is simply not possible. An additional, emerging risk is the rapid erosion of expertise on working with older equipment now that the production environment –where technicians are traditionally trained- has turned digital. For the contents of millions of analogue carriers waiting to be digitized this combination of disappearing equipment and dying skills is a severe threat.

digitization: between the devil and the deep blue sea

The majority of respondents are involved in digitization activities, and the overall impression is that they would do more if they were not plagued by so many uncertainties about conversion standards and longevity of digital materials. Because of these uncertainties, a fair number of institutions appear to be biding their time. Some indicate they focus on keeping analogue originals in acceptable condition, and many state they keep analogue originals after digitization in case digital files are lost or prove to be of insufficient quality. Although keeping analogue recordings after reformatting is sound archival practice, what emerges here is primarily distrust of the digital environment.

A lot of digitization is done on an *ad-hoc* basis, at the request of users. Preservation is most often given as the reason for undertaking digitization activities but only a minority have developed structural programmes. Much is done with 'soft money' in temporary projects, and all signs point to an infrastructure that is inadequate in many respects to ensure that digitization is indeed a stable preservation strategy.

Many respondents appear worried by the lack of generally accepted standards for digitization at preservation quality, as well as the constantly evolving formats in the digital environment. In the case of film, digitization is generally regarded as an access strategy, but especially for video the lack of a preservation standard is felt to be a problem. Even in audio digitization, where standards have been developed and it is relatively easy to observe them, master copies at preservation quality are not created by all respondents involved in converting at-risk materials.

A cause for concern is the widespread use of optical carriers as the main or sole storage medium for digital masters. Even though many respondents are aware of the unreliability of optical disks, mass-storage systems have been set up by only a small minority, mostly broadcasters and large audiovisual archives.

In spite of the lack of expertise and experience, the problems with playback equipment, and the absence of reliable storage systems, the majority of respondents undertake most or all of the digitization work themselves. Only a third outsource (some of) the work to external parties.

in conclusion

This survey makes overwhelmingly clear that there is a huge amount of valuable audiovisual material spread over a large number of institutions that are at the moment not in the best position to guarantee long-term access and preservation. The conditions under which analogue recordings are kept are often not adequate, and lack of resources, equipment and expertise make it a giant step for mixed-media institutions with small minority collections to move them into the digital domain. Yet the solution of the deadlock situation lies in this step, which would dissociate the technical aspects of preservation of carriers and data from the work of providing contents and context.

Audiovisual materials that are left on the shelves will one day be lost to us. Conversion of analogue materials to digital is inevitable and urgent, for the preservation of their contents and to provide access to the wealth of information and cultural-historical documentation that they represent. It is the task of public institutions to provide the level of access our society demands in the 21st century. Hypes on the web may sometimes seem far removed from the daily managament of heritage collections, but the changing expectations for access and use cannot be ignored.

The interest in sound and moving image materials has turned out to be immense now that they can be accessed easily, and there is every reason why audiovisual materials in small mixed-media collections should be high on the list of candidates for digitization. However, the instutions that hold them cannot be expected to carry out this task on their own. It is high time to recognize that materials in minority collections are part of the audiovisual heritage and to include them in national programmes, while respecting their natural habitat, within the institutions where they belong. The audiovisual specialists in Europe should make efforts to create centres of expertise to support this huge operation and lighten the burden for institutions with limited resources. Instead of relying on one large national audiovisual institution to fulfill this role, a support network should be built around existing pockets of expertise for work at local or regional level, or across geographical borders for collections with specialist materials.

Combining the experience of large organizations with the knowledge of those working with smaller specialist collections will allow a range of approaches to develop that does justice to the varying needs in audiovisual archiving. Cooperation will bring advantages of scale for minority collections of standard materials, whereas the input of specialist archives, managed from a thorough knowledge of their contents with specific users in mind, will contribute to customized small-scale solutions where these are needed. That there can be no 'one size fits all' approach follows from an appreciation of the diversity of the audiovisual heritage and should be one of the principles on which a broad national strategy is based.

Heritage institutions will have to re-define their tasks in management of collections and recognize it is not the same as keeping physical objects on their own premises. To extend their lifespan, audiovisual carriers need special storage conditions, but the wisdom of providing such dedicated storage in every institution that has a few hundred or thousand of hours of materials is questionable. Similarly, highly automated mass-storage systems for long-term management of digital materials need not be created in every heritage institution. Storage of both analogue and digital (master) recordings could well be outsourced to specialist repositories, if such services were to become available at affordable prices. As long as the institution can provide access over the network, they do not have to keep the materials themselves.

The development of networks of expertise for conversion of audiovisual materials and storage facilities for analogue carriers and digital masters in no way takes away the curatorial responsibilities from the institutions where these audiovisual collections belong. Outsourcing work and using services does not imply loss of control over the material. If banks manage our financial transactions and keep our money for us it is because we consider this safer than putting it under the mattress, but the money is still ours and we decide what to do with it. Institutions that own the materials should make arrangements to make sure that they are managed in the best possible way. This includes making critical assessments of what can be done efficiently and effectively at the level of the individual institution.

The work involved in keeping heritage collections alive is immense and the resources to do this will always be limited. The one thing that distinguishes collection keepers is knowledge of the collection, its history and its users. To preserve the audiovisual heritage for the future it will have to be opened up, and this is the main task of those who are keeping the collections. The descriptive work that this involves, the contextualization, the research, the rights management and the services for individual users can only be provided by the heritage institutions themselves. This will be enough to keep them busy for a good while yet.

Introduction

1

1.1 Background

The research for this report was undertaken in the framework of TAPE,[1] Training for Audiovisual Preservation in Europe, a project supported under the EU Culture 2000 Programme that ran from 2004 to 2008. TAPE was initiated by the European Commission on Preservation and Access (ECPA) with four partners: the Finnish Jazz and Pop Archive (Helsinki), Head Office of State Archives in Poland (Warsaw), Phonogrammarchiv of the Austrian Academy of Sciences (Vienna), and the Reproduction, Binding and Restoration Centre for the State Archives of Italy (Rome).

The motivation for starting the project came from two sides. In the preceding years the ECPA had run a project on photographic collections, which made us realize there are many 'minority' collections in heritage institutions. These collections belong where they are because of their contents, but happen to be on media which require specialist expertise that is often only found in dedicated institutions (like a museum for photographs). We were already planning to explore this issue further for audiovisual media when we came into contact with colleagues involved in PrestoSpace,[2] developing technology for managing the audiovisual archives of the future. One of the goals of TAPE became to help bridge the gap between, on the one hand, the world of broadcasting and huge dedicated audiovisual archives where advanced technology is used for large-scale management and, on the other, those managing minority collections of sound and moving image in archives, museums, libraries and institutes.

This survey focuses on these minority collections, of which there must be many thousands all over Europe. Characteristically they have suffered from neglect, not only because they are difficult to deal with for institutions built around the management of (mostly) paper documents, but also because the audiovisual heritage is often thought to reside in dedicated film museums, sound archives, audiovisual institutions and broadcasting archives, usually operating at a national level. Most of the references to 'audiovisual heritage' in the political debate, especially in the EU, concern either the cinematographic heritage or the multimedia production environment and broadcasting. This view fails to do justice to the wealth of audiovisual materials kept outside the mainstream, and has resulted in lack of supporting infrastructure for those in charge of these collections.

That broadcasters, film museums and audiovisual archives hold a large share of the audiovisual heritage has reinforced this tendency. But size is not by definition a measure of quality or value, and value is not restricted to what is considered important as *national* heritage. Evolving concepts of heritage have led to the recognition that light entertainment of today can be a future window on the past and a potential resource for serious study. Yet it is somewhat ironic that

1 For more information, see URL: http://www.tape-online.net
2 For more information, see URL: http://www.prestospace.org

television quiz shows or soaps should now be considered worth preserving for future generations, whereas documentation of daily life and popular culture of former times is languishing in little known local collections. The strong presence of broadcasters and commercial parties in the heritage field therefore also reflects the importance attached to their capacity for exploiting the economic value of audiovisual collections.

The value of minority collections often lies at the local or regional level, or in their importance for specific user communities, or for research. That it concerns smaller user groups or specialist materials does not make the collections less important. As resources for understanding cultural identity and diversity, for research in local history, for reinterpretation and new productions using old recordings, for specialist research in the history of music, languages, and performing arts, minority collections may be of huge value. That is why these collections were built and that is why they have been preserved. Now that the internet with its 'long tail' makes it possible for any niche interest to find an audience,[3] and digital technology facilitates access and presentation of audiovisual documents, there is every opportunity to bring them out into the open. This reports sets out to indicate where we stand and what has to be done to make sure we do not lose access to this variety of historical materials outside the mainstream.

1.2 About the research

The research is largely based on the data collected through a questionnaire. This was developed among the TAPE partners in English and translated into seven other languages: Finnish, French, German, Italian, Polish, Russian, and Spanish. It was made available as a PDF file and web form in all eight languages on the project's website and announced to more than twenty listserves.

The project sent out questionnaires to over six hundred addresses all over Europe: (national) archives, (national) libraries, (national) film and sound archives, film museums, academies of science, research institutes, professional societies and organizations of information professionals. The partners in the TAPE project used their own national networks to encourage colleagues to participate to the survey, which resulted in a relatively large number of respondents from Poland, Finland, and Italy.

Finally we received 386 responses from 41 countries. A few were excluded from the analysis because they did not concern European collections. Many respondents sent additional information, and many referred to their website, all of which helped us to gain a picture of the organizations and their activities.

We also received existing reports on the situation in some countries, and data of other national surveys, among them one or two quite extensive ones. Together

3 Chris Anderson, *The Long Tail: How endless choice is creating unlimited demand*, Random House, 2006.

with the desk research this provided the necessary background for our analysis. We consulted experts and made working visits to relate the results of the survey to a wider context. During the TAPE project there were a number of training events and expert meetings that were also opportunities for gathering information and examples for the story told here.

The data were collected in 2005-2006. Analysing them took us much longer than we had planned. With the growing number of responses, both the necessity and the complexity of getting things somehow standardized, to enable calculations and comparisons, increased. Many of the 45 questions were subdivided and offered room for additional comments, which resulted in lot of extra information, in any of the eight languages. And there were many occasions when we decided we needed to do further research.

We did extensive calculations to convert all data on collection size and presence of carriers (which could be indicated in cans, titles, items, hours, meters) to hours. This required a great many decisions where respondents submitted incomplete or contradictory data. The conversion rates we used were on the whole quite conservative, and as many respondents were not able to supply complete information, the estimates of quantities of audiovisual materials are without any doubt all too low. Given the disparities in collection sizes, the bias in the survey population, and the many missing pieces we did, however, not feel comfortable about extrapolating figures for all respondents. The data are presented as we collected them, and readers can draw their own conclusions from the figures. The calculation methods are summarized in Appendix A.

A specific problem for generalizations and extrapolation was the presence of some extremely large collections, mostly of broadcasters but also of other organizations that function as national audiovisual archives. These collections dwarf those in other institutions: in some cases a couple of very large organizations hold more of a specific material than all the other respondents together. When we tried to present a view of the amounts of materials or carriers in different types of organizations, these giants sometimes dominated the scene to such an extent that we had to exclude them from the figures. This we did only occasionally, for though size matters, it is not necessarily directly related to the qualitative aspects we discuss. If large collections have bigger problems, they often have more possibilities of addressing them – but at the same time there are large collections where possibilities are few, as well as small collections where things appear to be well under control. Moreover, much of the responses concerns assessments of the reality in institutions, which are partly determined by the awareness of possible problems. Those who can recognize dangers see them sooner, and others who express fewer concerns do not necessarily have fewer problems. This complex of factors makes distinctions on the basis of size for most of the issues raised in the survey not very meaningful.

Although the context for management of heritage collections is evolving rapidly, with the spread of digitization and the dominance of the web as an information resource, structural large-scale action to move audiovisual materials into the digital domain is still limited to the broadcasting environment and some large, specialist audiovisual archives, where they were always relatively well managed. The nonspecialist institutions that are the focus of our research are by and large only starting out on this path, and the disadvantages that small and minority collections have always had, in terms of expertise, staff and ranking in the list of priorities, also slows down their progress now. We are convinced that as a sketch of trends, problem areas and directions, this report presents the reality in institutions in Europe today, even though some time has elapsed since data for the survey were collected.

1.3 Target audience of report

This report has been written for a large audience of professionals and policy makers. No technical knowledge of audiovisual archiving is required to gain an impression of the situation in Europe. In fact, those professionally engaged in audivisual archiving will find a lot that is familiar to them but is presented here in an overview based on data from institutions that so far have not been at the centre of the debate on the future of audiovisual collections. The aim of the report is to encourage those in charge of mixed collections to develop strategies for preservation and access of their audiovisual collections, and to encourage the formulation of general (national) policies for this part of our heritage, by sketching the wider context.

The report shows there is an enormous amount of material in many different institutions that cannot all be expected to cope with this on their own. Collections are unique, but the problems and possibilities are shared over institutional and national boundaries. By providing a view of the thousands of minority collections of audiovisual materials that can be found in virtually every type of organization, we hope to convey the need of integrating their management into larger collection plans or coordinated projects for a sector. At the moment there are unprecedented possibilities for opening up collections through the use of technology, and unlike print media and archival documents, audiovisual materials depend for their survival on transfer to the new environment. They should therefore be high on the list of candidates for digitization. As long as they are regarded as somewhat exotic carriers outside the mainstream, the chances of their survival are slim. From this report preservation professionals will see that the problem they are facing in management of their audiovisual collections is not an isolated one. Policy makers will understand that investment in coordinated, structural programmes is inevitable to safeguard the wealth of knowledge and source materials represented by audiovisual materials outside the custody of large national audiovisual institutions.

Survey population

2

2.1 Geographical distribution

The total number of responses to the questionnaire was 386, from 41 countries. Some responses were received from North-America and Australia. Although they offer interesting data for comparison, these have been excluded from the analysis, as the aim was to sketch the situation in Europe. In the end the survey population consists of 374 respondents, from 34 countries (Table 2-1).

Table 2-1 Geographical distribution of survey population

country	no.of respondents	country	no.of respondents
Poland	63	Belgium	3
Germany	59	Czech Republic	3
Finland	46	Estonia	3
Italy	34	Serbia and Montenegro	3
Spain	23	Romania	3
France	23	Slovenia	3
United Kingdom	18	Latvia	2
The Netherlands	17	Iceland	2
Russian Federation	14	Cyprus	2
Austria	9	Croatia	2
Sweden	6	Greece	1
Hungary	5	Malta	1
Ireland	5	Republic of Macedonia	1
Denmark	4	Albania	1
Lithuania	4	Portugal	1
Slovak Republic	4	Turkey	1
Norway	4		
Switzerland	4	total	374

As was to be expected, a relatively large proportion of responses came from countries where TAPE partners and associate partners had encouraged institutions to participate and were actively collecting responses. Several professional organizations publicized the survey, which helped to generate responses from many other countries, the more so as the questionnaire was available on the web in eight languages. For Germany, Spain, Russia and France the response rate was relatively high, and many responses came from medium-sized or small institutions that presumably have a local, regional or national orientation (rather than international). An indication for this is that only a minority are members of international associations (like IFLA, ICA, IASA, ICOM, IAML), whereas quite a few are members only of national or regional associations (like Verband deutscher Archivare or Associacio de Arxivers de Catalunya). The geographical distribution and the high proportion of responses from medium-sized or small institutions provides valuable insight into the presence of audiovisual materials all over Europe.

2.2 Type of organization

2.2.1 Archives, libraries, museums and institutes

The type of organizations that responded is varied and is spread over all sectors (Table 2-2). The largest group are archives. This can partly be ascribed to the access TAPE partners have to networks of archival institutions, particularly in Poland and Italy where partners work with the state archives in their country. In addition, there were a considerable number of responses from municipal and regional archives, business archives and a variety of archives working in a specific area. Among the archives are organizations for specific categories of music, church archives, university archives, and a number of sound and film archives.

Archives in a narrow sense of the word (i.e. part of a country's public administrative system and with certain tasks defined by law) and documentation institutes or research centres are different types of organizations, but in terms of collections, management practice and activities, the line is not always easy to draw.[1] Apart from archival records many archives also actively acquire private collections for their cultural or historical value. Conversely, the term 'archive' is loosely employed for all kinds of organizations that aim to bring together a variety of materials around a theme or subject for permanent safekeeping. When they have a formal role in the archival infrastructure in a country and hence a long-standing role for preservation of heritage, we included these organizations in the category 'archives'. Organizations that also have an archive but are first of all defined by other core activities were placed in separate categories.

When the main tasks of respondents are aimed at promoting a cultural activity or subject, and the collection is managed to support these activities, instead of being a primary task by itself, we have classified them as 'institutes'. The archive or library then usually provides documentation within the framework of activities for a general audience, as can be seen from the definition of a music information centre, set up 'to promote the music of its own country by distributing general information on it both at home and abroad and by supplying both printed and copied music for scholars and performers'.[2] Among the respondents are institutes for a specific type of music, for a region, for theatre or art, or documenting life and work of a writer or composer. When the collections include specialist materials resulting from academic field work primarily serving academic researchers and the organization has its own research programme, it has been placed in the category 'research institutes'.

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1 For discussion of types of institutions see Ray Edmondson, *Audiovisual Archiving: philosophy and principles*, 2nd revised edition, UNESCO, 2004, p.34ff. URL: http://unesdoc.unesco.org/images/0013/001364/136477e.pdf.

2 General definition of tasks as defined by the Finnish Music Information Centre, see 'history' in the 'about FIMIC' section at URL: http://www.fimic.fi/.

Table 2-2 Survey respondents by sector

sector	no. of respondents	% of total respondents
archive	143	38
library	81	22
museum	42	11
research institute	28	7
institute	26	7
broadcasting	21	6
commercial company	10	3
private collector	9	2
other	14	4
	374	100

The category 'libraries' includes public libraries, national libraries, research libraries, music libraries and specialist libraries. Some larger libraries have special departments for audiovisual materials, which may be anything from a music library for research to a multimedia centre that supports teaching. Libraries are most likely to have a large proportion of commercially produced materials for lending, like gramophone records, cassettes, CDs and DVDs, a characteristic they share with other multimedia centres (médiathèques, video lending libraries). We put all of these in the same group as the presence of large amounts of non-unique materials has consequences for collection management and preservation. For instance, one of the multimedia centres describes their preservation policy as buying new copies on DVD of films that can no longer be shown on VHS. A respondent with an audiovisual collection for language teaching in a university library ironically remarked 'language programs luckily "age" so soon that long term preservation is not a big problem'.

At the same time, very extensive responsibilities for audiovisual heritage have been assigned also to the library sector, as in countries where regulations require deposit of the national audiovisual production with the national library. As a result, the audiovisual collections of some of the national libraries of Europe are amongst the largest in the survey. This mostly concerns commercially produced, published materials, but even if many copies exist in other places, these national deposit collections by definition will have to be preserved indefinitely.

Museums include city and regional museums, ethnographic museums, military museums, and museums for theatre, agriculture, mail and telecommunications, traffic, broadcasting, art or literature. For some of these museums audiovisual materials belong to the core of their collections, for others they have a documentary or supporting function. A theatre museum will have registrations of plays and musicals but also interviews with actors and directors. An ethnographic museum may hold original field recordings made in research projects as well as LPs with traditional music. Some museums function primarily as archives

of audiovisual materials, but they will then usually also have a programme to show film or video. For film, there are film institutes, film archives and film museums, but whether this implies a different emphasis in collection building and management is not immediately clear.

2.2.2 Broadcasting

Although broadcasting organizations and film distributors were explicitly not the target group of this survey, a number of them still sent in responses. Some of these are medium-sized regional or local organizations, some are (also) publicly funded and some (also) have a heritage role. It depends on the division of responsibilities with national audiovisual archives, deposit libraries and museums for film and broadcasting within a country to what extent film, radio and television companies are regarded (and regard themselves) as heritage organizations. In Finland, for instance, there is no public institution that keeps broadcasting materials, and hence the archive of the Finnish broadcasting company has an important role for preservation of the audiovisual heritage.

The production environment characteristic of such organizations has not always been conducive for preservation of older materials – just as publishers have not always been the best archivists of their own books. However, the last decades have seen a shift in the position of archives in the content industry as a consequence of the rise of home viewing of videos and DVDs, Internet downloads, streaming video and audio, and the trend towards 'multicasting'.[3] No longer perceived as a storage room for old recordings that, once transmitted, have become largely useless, but rather as a valuable collection of assets to be managed for re-cycling in a huge market, the archive has moved to the centre of attention. With new technology facilitating management, content producers are heading for all-digital environments where the archive is seamlessly integrated in the production workflow. As the incentive is the possibility of re-use, there are potential conflicts here with the professional archival approach to selection and preservation of original materials. But if there is a difference in approach, it must also be acknowledged that over the last decade broadcasters in Europe, by running large joint projects, have put the audiovisual heritage on the map.[4] They have contributed to the development of new technology and strategies that, if not immediately transferable to the average city archive, still have wide relevance for the thinking about audiovisual archiving in the heritage sector.

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3 Think of online distribution of radio and television programmes, but also e.g. the recent experiment with simultaneous release in the cinema, on DVD, and on cable TV of the Soderberg movie Bubble (see Ken Richardson, 'Simultaneous theater/TV/DVD release riles cinema owners', *Sound & Vision Online* April 2006. URL: http://www.soundandvisionmag.com/features/1283/simultaneous-theatertvDVD-release-riles-cinema-owners.html)

4 For instance, PRESTO and its successor PrestoSpace which aims 'to provide technical solutions and integrated systems for digital preservation of all types of audiovisual collections', URL: http://www.prestospace.org.

Where production and archiving are seen as separate activities, public institutions may assume the responsibility for preservation of radio and television materials; among the respondents to the survey there are several examples of this. Especially small or local broadcasters sometimes fall outside national provisions for preservation of broadcasting material, as the desperate comments of a smaller broadcaster show: 'we work on this project as enthusiasts, no (one else) wants to do it in our country. We have (...) radio with 1,5 million titles. They do not do it!'. Local radio and television stations may be anything from sponsored, commercial music channels to publicly supported stations that bring news and events and serve a specific community. In The Netherlands, for instance, there are around 15 publicly funded regional radio and television stations; their radio channels together reach more listeners than any other in the country and around a quarter of the Dutch population watches some regional television programme in the evenings.[5] These broadcasters often deposit archival materials with regional archives and cooperate with them on the production of webpresentations and DVDs with historical materials. Research done on archiving radio and televison programmes in Ireland showed a wide variety of archiving practices, with some broadcasters keeping everything, some nothing, and the rest somewhere in between.[6]

In the category of broadcasters, there is a large disparity, of major broadcasters in Europe next to what appear to be shoestring operations for a specific target group, but they are alike in that they all make their own recordings in professional formats. We have grouped them together because they share characteristics not found in any of the other categories and because size is not the sole determining factor for management of collections. We have sometimes separated out the major broadcasters when the sheer size of their collections would obscure the overall variation in a group.

2.2.3 Research collections

The TAPE project has set as one of its goals to bring to light more information on audiovisual collections created for research. Materials held in universities and research institutes are often hard to identify; some of these materials may not even be in proper collections but kept by researchers themselves. As one research institute noted: 'tapes and cassettes are part of private scientists' materials'; they could therefore not provide information about quantities, condition or content. Yet it is these materials, often recordings of field work and interviews, that may constitute unique content that deserves to be kept for its cultural-historical value or for future research. In the present survey most responses from the academic

5 See 'Over ROOS' at URL: http://roosrtv.lionhead.nl/?pageid=3432.

6 Hibernian Consulting, *Archiving of Radio and Television Programmes in Ireland*, discussion paper, November 2005, p. 21 URL: http://www.bci.ie/documents/S&V_archiving.pdf.

community concern established collections, but it provides a starting point for exploring this particular issue further in future activities.[7]

As in research institutes management of materials is often closely related to research interests, particularly the programme of the organization itself, the role of these organizations as archiving institutions is diffuse. Some established collections function as proper archives, with a commitment to long-term preservation, and actively collect materials in their sphere of interest. But as in many cases funding is made dependent on research results, academic institutions often find it hard to keep up their commitment to maintain large collections that are not of immediate relevance to current research interests. Sometimes such collections find a place in a university library or museum, sometimes they are primarily funded through an academy of sciences, but in general their existence is somewhat precarious when research programmes develop in new directions. Especially with changes in the information infrastructure, which reduces the need of researchers to frequently consult collections that provided essential information in the past, long-term preservation becomes a cause for concern. Collections of biological and geological specimens no longer play the same role they had fifty years ago and have sometimes been transferred by universities to museums or been abandoned altogether. At present there is a renewed interest, under the influence of the need to find solutions for maintaining huge collections of digital materials, in long-term access to research data.[8] This will possibly also offer some opportunities for integrating audiovisual materials created for research in digital collections to be managed by dedicated data archives.

Many archives, libraries and museums in the survey also hold research collections, sometimes very important ones, but there they will be managed as heritage collections. The special position of collections in research institutes was the reason for singling them out and placing them in a separate category, which includes also a couple of organizations that call themselves 'archive' but that, as appears from the information they supplied and their websites, are strongly involved in academic research.

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7 A study specifically focusing on audiovisual research collections was carried out in the framework of TAPE by the Phonogrammarchiv in Vienna, see URL: http://www.tape-online.net/docs/audiovisual_research_collections.pdf

8 Several international bodies published documents and recommendations on this issue in the last few years, e.g. OECD 'Recommendation of the Council concerning access to research data from public funding', C(2006)184, December 2006, URL: http://webdomino1.oecd.org/horizontal/oecdacts.nsf/Display/3A5FB1397B5ADFB7C12572980053C9D3?OpenDocument, European Commission, 'Scientific information in the digital age: ensuring current and future access for research and innovation', Communication IP/07/190, February 2007, URL: http://ec.europa.eu/research/science-society/document_library/pdf_06/communication-022007_en.pdf. Organizations working in this field are, for instance, the Digital Curation Centre URL: http://www.dcc.ac.uk/, Digital Archiving and Network Services URL: http://www.dans.knaw.nl/.

2.2.4 Private collectors

An interesting category are the private collectors, some of whom have brought together considerable amounts of material, also material that is not easily found elsewhere. One private collector, for instance, indicated that his collection is used by a broadcasting company that no longer possesses all the old recordings needed for a series of programmes. Most of these collections concern gramophone records and tape recordings of concerts and radio programmes, but films are also widely collected. From the comments and documentation these respondents volunteered, it is clear they regard their collections as heritage materials that need to be kept for future generations. It also appears that they often devote a substantial amount of time to their collections, perhaps more than many heritage institutions can afford to spend on their audiovisual materials. From documentation that respondents supplied it could be seen, for instance, that large collections are meticulously described at a level of detail to which some institutions can only aspire. Private collections are actively acquired by some archives; even the BBC has started a 'treasure hunt' for materials held by private collectors that is not (or no longer) in the BBC archive.[9]

In view of accessibility and continuity it is no doubt preferable if collections are kept in an institutional setting, but many of them are first created by private collectors. The institutional framework only to some extent reflects the broad and varied responsibilities a society feels towards the record of its past, and cultural heritage is evolving also from what individuals and communities consider worth keeping and maintaining themselves. With so many people exploring the potential of the internet to share materials with others with similar interests, one might speculate about alternative scenarios to the institutional approach, in which communities of private collectors jointly support access to distributed content over a long period of time. Several of the respondents indicate they already provide digital copies to others on request. On the other hand, especially with records, value is attached to the object (labels, sleeves) as well as to the content, and survival of the physical collection will be a primary goal. Such items will continue to be traded, bought and sold in the private market as long as there is an interest, but it is also possible that private collections may one day find their way to a museum or archive that will then need to keep the original carriers and maintain playback equipment.

9 The website asks 'anyone who has recordings of pre-1980 television or radio programmes that might not be held by the BBC to let us know, so that we can have them back and they can be preserved for the enjoyment of generations to come.' URL: http://www.bbc.co.uk/cult/treasurehunt/about/about.shtml.

2.2.5 Commercial companies, and others

Commercial companies are another group that volunteered information although we did not explicitly target them. Most of these respondents are somehow involved in film production, distribution or archiving. Some keep and distribute materials produced by others. In this group we also find a few corporate archives. It would have been interesting to have more information from corporate archives as these sometimes hold unique documentary (promotional, instruction) materials, especially film. In the category 'others' we find a few organizations that collect and preserve media art, and very specific services like those that record parliamentary sessions.

2.3 User groups

Respondents were asked to indicate of five user groups how important they are for their organization on a scale from 1 to 5. They were also invited to add information on special groups they serve.

Academic researchers and students were mentioned by respectively 158 and 128 respondents (out of 336/7) as the most important user groups (Figure 2-1). Not only research institutes and university libraries, but also many archives primarily serve the academic community. For a quarter of respondents the general public is the most important user group. Publishing, the media or other commercial users were marked as most important user group by a total of around 16% of respondents.

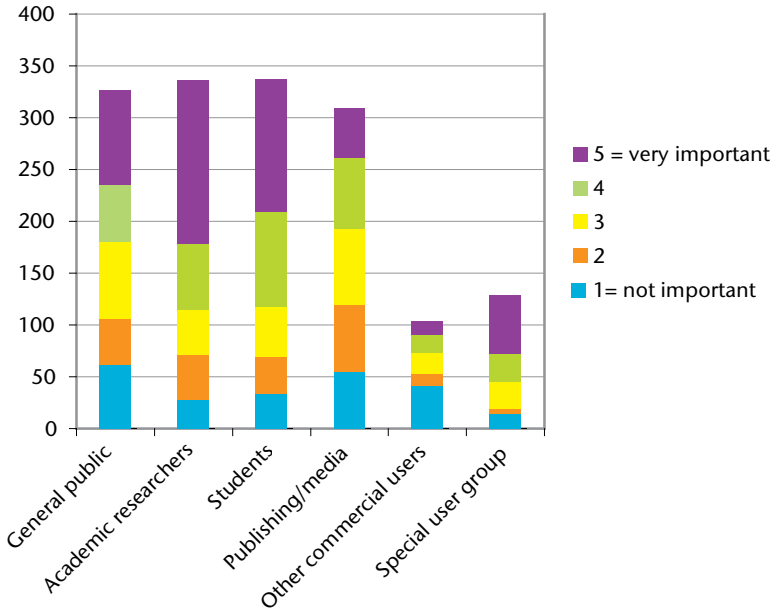
Special user groups in most cases are staff working in the larger organization to which the collection belongs. This is the case with municipal and corporate archives, and also with broadcast archives that supply older recordings to programme makers. The use of older materials for new productions spreads to specific user groups outside the own organization when musicians, composers, theatre makers, visual artists etc rely on the collection for source materials and documentation. In recent years, for instance, there is increasing interest among young (pop) musicians to integrate motifs and instruments of traditional music in their own work.

2.4 Professional network

Just over half of all respondents are member of a national or international professional organization. About two-thirds of these (around 120 respondents) are (also) member of associations working in the audiovisual field. The International Association of Sound and Audiovisual Archives (IASA) is mentioned most often, but there is an obvious bias here as many IASA members responded as a result of the publicity for the survey by the German IASA-branch (Ländergrüppe Deutschland/Deutsch Schweiz).[10] Other international organizations mentioned several times include: International Federation of Film Archives (FIAF), the

10 On the other hand, IASA was not the only association that publicized the survey, so this overrepresentation can also be interpreted as an indication of the level of involvement of its members.

Figure 2-1 Relative importance of user groups



International Federation of Television Archives (FIAT), Association for Recorded Sound Collections (ARSC), the International Association of Music Libraries, Archives and Documentation Centres (IAML), the International Council for Traditional Music (ICTM), Oral History Society, the Federation of Commercial Audiovisual Libraries (FOCAL), Association Européenne Inedits (AEI), and the Union Internationale du Cinéma et de la Vidéo Non Professionnels (UNICA).

Around 40 respondents indicate they are members of a national rather than an international audiovisual association or network, or an audiovisual section of a national associations.[11] Frequently mentioned are also the international sector organizations like the International Council on Archives (ICA), International Council of Museums (ICOM) and the International Federation of Library Associations and Institutions (IFLA) or their audiovisual sections. Many respondents mention national professional associations of librarians, archivists or museum staff, often for a specific type of institution (for art libraries, business archives, performing arts, regional archives, etc).

11 Among those mentioned are the Society of Archivists Film and Sound Special Interest Group, Sectie Audiovisuele Archivering (AVA), The Netherlands, Национальная ассоциация аудиовизуальных архивов РФ (Russian Federation), Association Images et Bibliothèques (France), Fédération des Cinémathèques et Archives de Films de France (FCAFF, France), Deutscher Grammophon Club (Germany) and the Sekcji Fonotek przy Stowarzyszeniu Bibliotekarzy Polskich (Poland).

The most striking finding here is that almost half of the respondents do not mention *any* professional association (even though the survey was publicized through several important associations and their members would therefore logically be over- rather than underrepresented). The percentages are similar for all sectors, but there is a clear correlation with the size of collections, with membership to one or another professional association going up from 40% for the smallest collections to around 75% for the largest. Among the large collections without any memberships are corporate archives and private collectors, but also libraries and a school for film and video. The percentages for membership are particularly low in countries like Poland and Italy (around 20%). This may partly be due to the strong presence there of national sectoral infrastructures of services and support for cultural institutions, which reduces need for self-organization of the sector in associations and interest groups. Many archival institutions in these countries, for instance, are part of the state archive system and will rely on this first and foremost for professional information and guidelines.

An important conclusion is that the majority of institutions are not directly involved in developments regarding management of audiovisual collections that are initiated by professional organizations. Many institutions with audiovisual collections do not belong to any association at all, or primarily participate in (national) networks for their sector, or for specific types of collections in terms of content (theatre, music, folklore, literature, art). If there is a global community of audiovisual archivists, a considerable number of those in charge of audiovisual collections obviously are not part of it; they identify with another professional sphere – in which audiovisual may well be a minority interest. For the audiovisual community this means that communication with potentially interested colleagues is often indirect, with other networks or institutions acting as intermediaries. The minority position that the large number of smaller audiovisual collections in nondedicated institutions have, within the institution itself and within professional organizations, makes it difficult to ensure their concerns are adequately reflected in policy documents and programmes.

2.5 Professional training

One of the aims of the TAPE project was to promote training for management of audiovisual collections. When film, sound or video materials are kept in non-specialized institutions, these small and medium-sized collections are typically managed by one or two (parttime) staff that have not had formal training for audiovisual archiving. In most countries archive and library schools do not offer a curriculum for audiovisual training, although there may be one or two (optional) modules devoted to the subject. By and large, higher education courses for film and media studies provide a background in theory and history, but are

not usually oriented towards the technical and practical aspects nor do they provide training in librarianship or archival management. There are workshops and seminars offered for continued training, but many of these are fairly brief and require travel and fluency in a foreign language (usually English), which places them out of the reach of the majority of staff working in smaller, nondedicated institutions.

For preservation of audiovisual media an additional complication is that technicians are needed that can work with obsolete and obsolescent carriers and playback equipment. Formerly such specialists were often trained in the industry and might come to work in the heritage sector. Now that production in the broadcast and media industry has largely turned digital, this source of technicians familiar with older formats is running dry. Yet this kind of expertise is badly needed, also in institutions engaged on digitization of audiovisual, as digitization to archival standards requires optimal signal extraction from the old carriers and hence specialist knowledge of these carriers and equipment.

The need for training is recognized by professional associations in the field; for instance, in 2006 the Co-ordinating Council of Audiovisual Archives Associations produced a working paper that outlines the present situation and summarizes needs and requirements.[12] The TAPE survey aimed to collect data on training that could fill in the picture and support efforts to create more training opportunities. We asked institutions whether their staff working with audiovisual materials had received professional training for this work, and whether they thought there were sufficient training possibilities in their country.

Of the 356 respondents that answer this question, 61% say their staff has not been professionally trained for working with audiovisual collections. Both in the 'yes' and the 'no' category, respondents sometimes read 'professionally trained' to mean 'trained as an archivist (or librarian)', which was not how the question was intended, but points to the recognition that professional training for this work involves several competencies. Among specialist audiovisual organizations, still 40% of respondents state their staff has not received professional training in this specific area, whereas in general institutions the figure approaches 70%. There is a clear correlation with size, but of larger specialist institutions (> 5000 hrs), 35% still do not have staff that has been specially trained.

When institutions do have professionally trained staff, the number of them, if specified, is in the large majority of cases quite low (1-4).

Many respondents volunteer comments, mostly explaining how their staff receives their training: 'they are learning-by-doing and participate in courses and

12 'CCAAA strategic framework for professional training and development – a working paper', revised version, 2006. This paper also mentions the few existing university degree courses in audiovisual archiving as well as workshops and courses offered by professional associations. URL: http://www.ccaaa.org/papers.shtml.

workshops when possible'. A large audiovisual archive says 'no one is trained as an archivist, they learned in practice', another comments 'most of the staff has gained their A/V knowledge through hands on at our institution'. A few respondents regard participation in workshops and courses as professional training, while another feels that in spite of 'regular participation in continued training and seminars' their staff lack such training. Many mention courses offered by professional associations (like the UK Society of Archivists' Module for Audiovisual Archives and the Swiss Memoriav) or or large national institutions (INA, Swiss National Sound Archives). Some employ (sound) technicians (but do not have specialists for cataloguing), others remark their staff have a degree in musicology or film studies, or received training as music librarian, media researcher or in cataloguing audiovisual materials. The most frequent comment is that staff learn on the job: 'we have no formal training, but do have a lot of experience', 'we learn from our own mistakes', 'la formazione del personale occupato é totalmente autodidatta'.

Overall, 20% of respondents feel there are sufficient training opportunities in their country, around 40% perceive a serious lack all around, and the remaining 40% believe that although there are some opportunities for training, more is needed. The percentages are more or less the same for the various sectors, except that satisfaction among library respondents is lower (only 10% of these respondents are happy with training possibilities). Views do not differ markedly with size of the collection, but there appears to be a correlation with the amount of specialization and responsibility in the audiovisual field: whereas specialist organizations are already slightly more negative about training opportunities than general institutions, audiovisual specialists with national responsibilities are even less happy with the situation. Perhaps an explanation is that the more one is confronted with what should be done, the more one realizes where knowledge and experience fall short of the task.

Training for technology, cataloguing and digitization are mentioned most frequently, but respondents also emphasize the need for more all-round training. As one respondent puts it: 'there is some formal technical training in either media or handling digital A/V material (i.e. digital signal processing), but the links to archiving are very weak'. Another comments: 'there are opportunities for basic preservation training but there is a lack of specially preservation training for AV collections'. A Norwegian organization says: 'there are university level courses in AV-production, as far as I know there is no specialization in conservation, preservation or curation of av-collections'. A Russian respondent stresses the need to train older staff, a comment from Switzerland underlines the 'minimale Kurse' in library and archive schools, and a Spanish respondent believes a push in the right direction is needed as 'little by little we begin to realize that the audiovisual material forms part of the national cultural heritage'. Of the countries with the highest

response rates (Finland, Poland, Germany, Italy), German respondents are the least negative about training opportunities (40% indicate these are sufficient), whereas satisfaction is lowest in Italy, where only 4% of respondents believe possibilities for training are sufficient and 60% perceive a serious lack.

2.6 Legal responsibilities

Just over half of all respondents state that their organization has a specific (legal) responsibility for collecting and keeping audiovisual materials. Amongst them are many archives, and several respondents refer to archival legislation. Apart from a definition in general terms of what constitutes an archival record to be preserved for perpetuity, in legislation explicit mention may be made of audiovisual documents, as in the German Bundesarchivgesetz that lists 'carriers of data, image, film, sound and other recordings'.[13]

The primary aim here is to preserve documents that somehow belong together, as records of administrative processes, with secondary importance given to physical characteristics. In other words, it does not imply a responsibility for audiovisual materials *per se*, as is the case for dedicated film and sound archives. The latter are often connected with a national library or archive, such as the German film archive in Berlin, a department of the Bundesarchiv,[14] or the British Sound Archive, which is part of the British Library.[15] In many cases their collection policy is supported by legislation for deposit of audiovisual materials.

Originally legal deposit was an instrument for safeguarding the national heritage in printed format by systematic collection of all that is published in a country. In most countries there is legal deposit for printed materials, sometimes this has existed for centuries. With the extension of the law to cover audiovisual productions, the national library, as the central agency in the deposit system, often was assigned responsibilities for preserving sound and film recordings. The Biblioteca Nacional in Madrid under legal deposit collects and preserves 'all types of documents printed or produced in Spain', including sound recordings, cinematographic documents, and video.[16] In Hungary it is mandatory for

13 'Unterlagen im Sinne dieses Gesetzes sind Akten, Schriftstücke, Karten, Pläne sowie Träger von Daten-, Bild-, Film-, Ton- und sonstigen Aufzeichnungen …' , Bundesarchivgesetz § 2 art.8. URL: http://www.bundesarchiv.de/benutzung/rechtsgrundlagen/bundesarchivgesetz/index.html.

14 See 'Das Filmarchiv des Bundesarchiv', URL: http://www.bundesarchiv.de/aufgaben_organisation/abteilungen/fa/index.html.

15 URL: http://www.bl.uk/collections/sound-archive/nsa.html.

16 Legal deposit includes 'todo tipo de documentos impresos o producidos en España. Así, junto a los libros, folletos, hojas, postales, carteles, trípticos, periódicos, revistas, mapas y partituras, ingresan vídeos analógicos, CD audio, disquetes, CD-ROM, DVD-ROM, DVD-vídeo'. Specifically listed are 'impresiones o grabaciones sonoras realizadas por cualquier procedimiento o sistema empleado en la actualidad o en el futuro; producciones cinematográficas, tanto de tipo argumental como documental: nuevos soportes (CD audio, disquetes, CD-ROM, DVD, publicaciones mixtas constituidas por distintos tipos de materiales bibliográficos, por ejemplo, libro, vídeo y CD…)'. Biblioteca nacional de España, ¿Qué es la BN?, Adquisiciones, Depósito legal, URL: http://www.bne.es/esp/bne/depositolegal.htm.

producers to deposit 'two deposit copies of each, non-book materials (sound recordings, video materials, documents in electronic forms etc.)' with the National Széchényi Library.[17] In France deposit extends to all audiovisual media, also broadcast materials, with responsibilities shared between the Bibliothèque nationale (sound recordings, moving image on carriers other than film, multimedia), the Institut national de l'audiovisuel (INA, broadcasting material) and the Centre national de la cinématographie (moving image on film).[18] Regulations, division of tasks and the types of material included in deposit law show a wide variety over different countries. Although comprehensive legislation is not a *conditio sine qua non* for effective preservation of the national heritage, audiovisual archives work on an insecure basis, especially when it comes to funding, if their responsibilities are not recognized. This is why the International Association of Sound and Audiovisual Archives (IASA) is urging for inclusion of audiovisual material in deposit legislation.[19]

In general, deposit collections are meant to be preserved for perpetuity and serve as a 'last resort' for materials that other institutions may not be able to keep in usable condition over the long term. For printed materials, which in principle survive for centuries if kept under good conditions, optimal storage and professional cataloguing were always sufficient to keep collections accessible. (That some printed materials decay through intrinsic processes of acidification and deterioration has only been recognized as a serious problem relatively recently.) For technology-based materials, however, passive preservation will not be enough. Access also depends on the presence of working replay equipment and ultimately, when this is no longer available, on transfer of contents to new carriers. Although audiovisual materials have long been considered heritage materials or records that need to be preserved (in the UK, for instance, the Grigg Committee concluded in 1958 that 'cinematograph films, photographs and sound recordings should be treated as public records),[20] the recognition that for technology-based materials preservation of the physical carrier does not ensure continued access to the information it contains has only come with the digital revolution. The National Archives of Australia, in a document on electronic records, quote a text

17 National Széchényi Library, 'History', URL: <http://www.oszk.hu/frame_en.htm?eng/konyvtar/tortenet/tortenet_index_en.htm>.

18 'La Bibliothèque nationale de France pour les documents imprimés et graphiques de toutes sortes (...),les phonogrammes de toutes natures, les vidéogrammes non fixés sur support photochimique, les documents multimédias; (...) le Centre national de la cinématographie pour l'ensemble des vidéogrammes fixés sur support photochimique, ainsi que les matériels de promotion des films; l' Institut national de l'audiovisuel pour les documents sonores et audiovisuels radiodiffusés et télédiffusés et leurs documents d'accompagnement;' Bibliothèque nationale de France, 'Dépôt légal', 'Qu'est-ce que le dépôt légal?' URL: http://www.bnf.fr/pages/zNavigat/frame/infopro.htm.

19 IASA, 'Policy guidelines for the legal deposit of sound recordings'. URL: http://www.iasa-web.org/pages/08guide_02.htm.

20 The National Archives, 'The history of the Public Records Act', URL: http://www.nationalarchives.gov.uk/policy/act/history.htm.

from the 1980s which explicitly includes magnetic tape but describes records 'as physical objects such as paper files, tapes, disks etc.'[21] This definition has come to be regarded as outdated, now that electronic records have entered the stage, but twenty years ago it was apparently still common to think of all records as physical objects.

Even when audiovisual documents on fragile carriers had long found their way into archives and deposit collections, the concept of a repository as a place where physical objects are kept still prevailed. In recent years, the movement to create trusted repositories for digital materials has brought about a shift in thinking about collection management, in which carriers are considered temporary means to store and access information that is periodically transferred to new formats. This new context may prove to be more congenial to the preservation of the audiovisual heritage than the traditional environment of deposit collections or records as physical objects.

In short, even when audiovisual documents on fragile carriers had long found their way into archives and deposit collections, the concept of a repository as a place where physical objects are kept still prevailed. In recent years, the movement to create trusted repositories for digital materials has brought about a shift in thinking about collection management, in which carriers are considered temporary means to store and access information that is periodically transferred to new formats. As Kevin Bradley says in an overview of audiovisual archiving and digital preservation: 'the goal of permanent media has been wrecked on the rocks of relentless progress'.[22] Preservation no longer depends on the reliability of carriers, but on reliable systems that can ensure permanence through continual migration. This new context may prove to be more congenial to the preservation of the audiovisual heritage than the traditional environment of deposit collections or records as physical objects.

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21 National Archives of Australia, 'Keeping electronic records. Appendix C - Terminology: records, archives, documents and data?' URL: http://pandora.nla.gov.au/pan/22377/20011102-0000/www.naa.gov.au/recordkeeping/er/keeping_er/append_c.html.

22 Kevin Bradley, 'Defining digital sustainability', *Library Trends*, summer 2007, retrieved from URL: http://findarticles.com/p/articles/mi_m1387/is_1_56/ai_n21092805/pg_4.

Collections

3

3.1 General

The first experiments to develop systems for the recording of sound and moving image were done with scientific applications in mind, to study acoustical phenomena and the intricacies of movement of humans and animals. It was also the science community that first established dedicated sound archives. The earliest institutions often coupled collecting activities to a research interest. The Phonogrammarchiv, the oldest audiovisual archive in the world, founded in Vienna in 1899, developed audio recording equipment for scientific field research and archived recordings produced by anthropologists and ethnolinguists.[23] The Berlin Phonogramm-Archiv, established at Berlin University in 1900 by Carl Stumpf of the Institute of Psychology, initially focused on acoustics and music psychology.[24] Research collections were also founded 1900 in Paris (Societé d'Anthropologie), 1908 in St. Petersburg, and 1909 at the University of Zürich. In 1911, at the Université de Paris, French linguist Ferdinand Brunot created his Archives de la parole, to collect audio recordings of a wide variety of languages and of well-known contemporaries, such as Alfred Dreyfus, Maurice Barrès and actress Cécile Sorel.[25]

Outside this circle of researchers using and developing recording techniques to study the world, recorded sound and moving image were soon taken up by the entertainment industry for entirely different purposes, and the materials that were produced were not considered stuff for serious archiving. Now we may be impressed to hear Edison's phonograph 'speak' in a recording from 1906,[26] then it was primarily entertainment to be enjoyed today. That is why there was no widespread archiving, and film, audio and video collections evolved – planned or *ad hoc* – in so far as institutions or private collectors considered materials worth keeping. Because initially the different media and their associated industries moved along separate historical paths, up to the 1930s audio and film collections frequently ended up in different non-specialized institutions.

As the need to safeguard these new media was not as evident as it may seem to us now, a lot was lost.[27] Of film from the silent era it is estimated that only 15% of the overall production has survived.[28] The main reason was not so much the

23 See 'History', Phonogrammarchiv Austrian Academy of Sciences, URL: http://www.pha.oeaw.ac.at/home_e.htm?/phawww/geschichte_e.htm&Bodyframe.

24 Koch, L.-C., A. Wiedmann and S. Ziegler, 'The Berlin Phonogramm-Archiv: A treasury of sound recordings', in *Acoustical Science & Technology* 25, 4 (2004), URL: http://www.jstage.jst.go.jp/article/ast/25/4/227/_pdf doi:10.1250/ast.25.227.

25 'La voix sur Gallica', Bibliothèque nationale de France, URL: http://gallica.bnf.fr/ArchivesParole/.

26 'I am the Edison phonograph', the recording starts, and continues to explain what it can do. Available at Wikipedia URL: http://en.wikipedia.org/wiki/Phonograph .

27 Ray Edmondson, *Audiovisual Archiving: philosophy and principles,* 2nd revised edition, UNESCO, 2004, p.26. URL: http://portal.unesco.org/ci/en/ev.php-URL_ID=15592&URL_DO=DO_TOPIC&URL_SECTION=201.html.

28 Silent Era has extensive data on silent movies including a listing of films from the silent era believed to be lost, see URL: http://www.silentera.com/lost/index.html.

poor condition of the nitrate base, but the tendency among film companies to meticulously destroy all film copies after initial release, to prevent unauthorized showings.[29] And as their income came from showing films, there was not much of an incentive to keep an archive of their own films that no longer attracted an audience.

Nor were sound or film recordings in these early years universally recognized as potentially valuable documentation of historical events.[30] In 1898 Matuszweski suggested a museum should be established for historical filmed images, as 'the cinema is indeed the most perfect means that can be given to anyone to re-live an event as-if-you-were-there and at-the-moment-when-it-happened'.[31] But twenty years later, in 1920, two renowned Dutch historians, P.J. Blok and J. Huizinga, were still extremely doutbful about the value of film for historical research. They advised the Royal Netherlands Academy of Arts and Sciences to be cautious in supporting the newly founded Nederlandsch Centraal Filmarchief ('Dutch Central Film Archive'), for, as they argued:

> Wherein lies the value of cinematographic recordings of actions for the future knowledge of the past? What kind of information can film supply that is not already provided by a photograph or description? Visible forms are adequately recorded by still photography. Film only adds to this the purely outward manifestation of motions. As a rule these will be either known, or of no relevance, for it concerns basically always the same motorial or mimical processes.[32]

Although film (and sound recordings) soon made it into the collections of traditional archives, museums and libraries, it took institutions some time to come to terms with these 'animated photographs': 'everybody could say what it was not; but nobody could say what it was', as a British journal wrote about film in 1896.[33]

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29 Wikipedia, URL: http://en.wikipedia.org/wiki/Silent_film

30 **Edmondson,** *Audiovisual Archiving,* p.26.

31 Boleslas Matuszewsk, 'A new source of history: the creation of a depository for historical cinematography'. Original publication in French *Le Figaro*, 25 March 1898. Translation by Julia Bloch Frey (1974), with an introduction by William D. Routt, URL: http://www.latrobe.edu.au/screeningthepast/classics/clasjul/matintro.html.

32 'Waarin acht men de waarde gelegen van cinematografische opnamen van bepaalde handelingen voor de latere kennis van het verleden? Welk element van wetenswaardigheid kan de film leveren, waarin niet reeds door de foto of de beschrijving wordt voorzien? De zichtbare vormen worden voldoende vastgelegd door de gewone fotografie. Het eenige, wat de film daaraan toevoegt, is het volstrekt uiterlijk verloop der bewegingen. Deze zullen in den regel óf bekend, óf onverschillig zijn: immers, het betreft uit den aard steeds dezelfde motorisch of mimische processen.' K. van Berkel (ed.) *De Akademie en de tweede gouden eeuw*, KNAW, 2003, p. 167. URL: http://www.knaw.nl/publicaties/pdf/20031039_06_Bijlage.pdf.

33 **Quoted in Edmondson,** *Audiovisual Archiving,* p.27.

Yet, even at this early stage there were also individuals and organizations that *did* recognize the cultural, historical or scientific value of audiovisual recordings, and more dedicated film and audio institutions evolved in the first decades of the twentieth century. The Imperial War Museum started collecting official film records of the First World War as early as 1917,[34] the Nederlandsch Centraal Filmarchief, established in 1919, preserved historical film,[35] and in the Soviet-Union the State Documentary Film and Photo Archive, founded in 1926, brought together films documenting the October Revolution and the events that followed.[36] Italian sound recordings, from popular music to voice portraits of famous contemporaries, were collected by the Discoteca di Stato in Italy, established in 1928.[37]

Audio and film archiving initially went their separate ways, with some exceptions – as in the Soviet-Union where the Central Photo, Sound, and Film Archive was established in 1934 as a state repository for all non-textual historical records.[38] In the 1930s the first large national film archives appeared in Europe (e.g. the British Film Institute National Archive 1935,[39] the Reichsfilmarchiv in Germany 1935 and Cinémathèque Française 1936[40]). When in Paris in 1938 institutions with film holdings joined in the Fédération internationale des archives du film (FIAF), this marked a milestone in the history of preservation of the cinematographic heritage. In the same year the Bibliothèque nationale de France set up the Phonothèque nationale, which was to serve as a national deposit for sound recordings.[41] These attempts at systematic and comprehensive archiving were early indications of the growing recognition of audiovisual materials as heritage worth preserving.

More national audio and film institutes were created in the first decades after the Second World War: the Filmoteca Española (1953), Filmoteka Narodowa (Poland 1955), the National Sound Archive (United Kingdom 1955), Finnish Film Archive (1957), the Hungarian Institute of Film Science (1957) and Swedish Film Institute (1963).

Around the same time a third audiovisual medium was introduced: video. More convenient for duplication and playback than film, video was an ideal

34 Luke McKernan, 'A short history of film archiving', URL: http://www.bufvc.ac.uk/publications/articles/historyarch.pdf.
35 Johan Oomen, 'Timeline Dutch audio visual archives,' 2005. URL: http://www.birth-of-tv.org/birth/assetView.do?lang=en&asset=1339149129_1129810991.
36 Russian Archives Online, URL: http://abamedia.com/rao/archives/rgakfd/hist.html.
37 Discoteca di Stato, URL: http://www.dds.it/.
38 ArcheoBiblioBase, URL: http://www.iisg.nl/~abb/abb_b11.html.
39 'History of the Archive', British Film Institute National Archive, URL: http://www.bfi.org.uk/nftva/work/history.html.
40 La cinémathèque française, URL: http://cinematheque-histoire.ifrance.com/.
41 'Historique', Le département de l'audiovisuel, URL: http://www.bnf.fr/pages/collections/dpt_audiovisuel.htm.

format for broadcasters. Not that it was immediately widely adopted: many broadcasters were very much accustomed to using 16mm film and initially could not afford the investment required to shift to video. At the BBC, for instance, film remained the standard medium for pre-recording programmes up till the mid-1960s. Only when video recorders became portable in the early 1980s, video (U-matic) replaced film as the format for 'newsgathering'.[42]

Broadcasters were the first to use and to archive video. Outside the broadcasting sector in the 1980s more and more researchers, artists and especially amateurs switched from film to video, which soon became the preferred format as it was cheap and easy to handle. This popularization was reflected in collections of traditional memory institutions, to which the new format eventually spread, and also in those of (research) institutes and organizations with film collections that used video for 'access copies'. Contrary to what had happened with audio and film, no dedicated national video institutions were founded; usually one of the existing national institutions assumed responsibility also for video.

In the last few decades there seems to be a tendency, especially at the national level, to bring the different types of audiovisual materials together in one audiovisual institution. Examples are the Swedish National Archive of Recorded Sound and Moving Images (1979), Beeld & Geluid in the Netherlands (1995), and the National Screen and Sound Archive of Wales (2001). Unlike their predecessors,[43] they all use neutral, generic names, presumably to indicate they deal with all kinds of media for sound and image, also current digital formats as well as any format the future may bring.

The general picture that emerges from the survey reflects the diverse historical paths followed by audio, film and video. The large majority of audiovisual collections are mixed, 'multiple media' collections. Most of them are in 'text-biased' organizations that manage also or primarily other materials. Of all respondents, 87% have audio, 83% video and 59% film (Table 3-1).

About a quarter of the respondents in the survey specialize in audiovisual materials: broadcasters, sound archives, film museums and film institutes, media centres, music libraries. Around 15 of these have specific (legal) tasks for collecting and preserving the national audiovisual heritage; the remainder of the 35 heritage institutions we identified as being charged with such tasks are national libraries and national archives that have responsibilities extending over all media types.

Respondents were asked to estimate the total size of their film, audio and video collections, and in the separate sections there were more detailed questions about

42 Richard Wright, personal communication, January 2007.

43 For example the Central Photo, Sound, and Film Archive of the USSR (1934) mentioned above, and the Latvia State Archive of Audiovisual Documents (1963).

Table 3-1 Number and size of collections for each medium

	respondents		unknown collection size		quantified collection		
	no.	% of all resp.	no. resp.	% of this group	no. resp.	total (hrs x 1000)	average (hrs x 1000)
film	219	59	67	30.6	152	894	6
audio	326	87	38	11.7	288	9386	33
video	312	83	38	11.2	274	10559	39
total	374					20839	

the number of items (or hours) for individual carriers and formats. As explained above (p.3, see also Appendix A), the calculations to come to totals for the whole group should be regarded as rough, conservative estimates. The specified amount of film then adds up to about 900,000 hours (Table 3-1). The estimate for audio materials comes out at ten times as much, at 9.4 million hours, whereas the video collections make a total of about 10.5 million hours. All three media types show a wide range of different sized collections. In general the average size of film collections is several times smaller than those of video or audio.

The size of collections makes a difference for their preservation, but other factors need to be considered as well. For instance, large collections may include a substantial amount of duplicates that are found in many other places, while a small collection may consist of unique and invaluable materials that are a first priority for preservation. But even if not everything depends on size, it does complicate matters if, as becomes overwhelmingly clear from the responses, so much simply is not known. About a third of all film respondents are unable to quantify their holdings, whereas one out of ten of audio and video respondents cannot tell how much they have (Table 3-1). When asked for details on specific formats, many respondents indicate explicitly that they do not know, or just skip the question.

The inability of many respondents to estimate the size of their collections no doubt partly results from lack of documentation on their contents. Cataloguing backlogs are reported by 144 respondents, and on the average this backlog concerns about a third of their collection. Not surprisingly, for all three media insufficient documentation is identified as the main problem respondents would like to see addressed. The relationship between the inability to quantify collections and the level of cataloguing appears from comments like: 'It is hard to give any exact figures, because most part of the collection has not been catalogued.'

However, even if material has not been fully described, one would expect there to be for instance simple inventories or lists on the basis of which at least a very rough estimate could be made. Yet this apparently is not always the case: for instance, an institution for film adds as a warning to the estimates they give: 'Please note: data based upon registered titles. There are still a huge amount of

nonregistered titles'. One wonders whether material about which there is no information at all is in fact regarded as part of the collection – or does it exist in a kind of limbo where no one has as yet assumed responsibility for it? In any case, that the most basic information about audiovisual collections is not always available in itself poses a risk to their survival. Preservation starts with knowing what one is responsible for, in terms of content, of carriers, and of size. The results of the survey point to a serious lack of such essential information that should be the basis for plans for long-term management.

3.2 Film collections

3.2.1 Overview

Nearly 60% of all survey respondents have film, and about half of these 219 are archives (Table 3-2), mostly 'text-biased' institutions with mixed collections. The national archives in Europe generally do not have large film collections; in some cases (e.g. Denmark, Slovenia, the Netherlands and United Kingdom) they cooperate with specialized organizations that –officially or *de facto*- have a responsibility for preservation of the national (audio)visual heritage. Many of these organizations are themselves also archives, for instance, the Irish Film Archive; Latvian State Archive of Film, Photography and Audio Documents; Finnish Film Archive; Archives Audiovisuelles de Monaco; Slovene Film Archives; and the National Screen and Sound Archive of Wales. Their role seems to be very similar to that of the national film institutes and film museums found in other countries, such as the Filmmuseum (Netherlands), Museo Nazionale del Cinema (Italy), Deutsches Filmmuseum (Frankfurt), British Film Institute, Det Danske Filminstitut (Denmark), Svenska Filminstitutet (Sweden), Irish Film Institute, and Norsk Filminstitutt (Norway). Their activities often range widely and may include lectures, screenings and film festivals, support for research and national film productions, managing film-related documentation such as film stills, posters and literature, and sometimes distribution of arthouse productions.

Although they primarily focus on national film culture, they may also hold foreign films, either because the copy adapted for distribution in the country is considered a work in its own right (think of dubbing and subtitling), or because the film is important for its impact on the national culture or for the history of cinema in general. For instance, apart from its large collection of Dutch films, the Filmmuseum in The Netherlands keeps copies of films distributed in the country, like the Hollywood blockbuster *Titanic*, and a couple of years ago it restored the American 1922 classic *Beyond the Rocks.*[44]

In fact, all these institutions seem to have a lot in common, but the different

44 *Beyond the Rocks*, 'The discovery and restoration', URL: http://www.silentsaregolden.com/featurefolder7/BTRdiscoveryrestoration.html.

Table 3-2 Film respondents by sector

type of organization	resp. by sector		unknown amount		quantified amount		
	no.	% of total resp.	no. of resp.	% of resp. in sector	no. of resp.	hrs x 1000	% of total amount
archives	105	48	30	29	75	193	22
libraries	30	13.7	14	47	16	34	3.9
museums	29	13.2	7	24	22	60	6.7
institutes	18	8.2	6	33	12	7.2	0.8
research institutes	11	5.0	4	36	7	1.7	0.2
broadcasters	6	2.7	0	0	6	515	58
commercial comp.	7	3.2	2	29	5	65	7.3
private collectors	4	1.8	1	25	3	0.8	0.1
others	9	4.1	3	33	6	16.7	1.9
total	219		67		152	894	100

names – archive, institute, museum – may still reflect a different positioning of the organization. The use of the term 'archive' may be understood as expressing a commitment to systematic collection and preservation of film as cultural heritage, with the physical archive as the basis and the core of the activities.[45]

National film institutions (which also include a number of libraries) usually have substantial collections, especially when they function as legal deposit: 'the archive has virtually everthing,' one respondent writes. Apart from feature films, shorts and documentaries produced in the country, some have amateur film, and newsreels deposited by broadcasting companies.

The majority of responses to the survey do not come from specialist film institutions, but from organizations that only hold film in so far as it relates to their main area of activity and that – with the odd exception – do not have feature films. In local and regional archives we find mostly amateur or semi-professional documentary material, promotional films of the city or region, and footage of local events, sometimes also professional film from regional broadcasters and cinema newsreels. Corporate archives, such as the historical archive of a bank, mention old commercials and promotional and instruction films. Special archives, museums and institutes have documentary film of regional or local interest, interviews, amateur films of local events; films as cinematic art; original

45 The relevance of names of institutions as indication of their orientation and commitment is discussed by Ray Edmondson in connection with transformations of the national film institutions in Australia and Great-Britain. See Ray Edmondson, 'A case of mistaken identity: governance, guardianship and the ScreenSound Saga', *Archives and Manuscripts, Journal of the Australian Society of Archivists* 30, 2002, pp 30-46 [available from URL: http://www.afiresearch.rmit.edu.au/archiveforum/documents.html] and 'Parallel lives: Britain's national film and television archive and Australia's national film and sound archive under threat', *Senses of Cinema* 33, Oct-Dec 2004, URL: http://www.sensesofcinema.com/contents/04/33/contents.html.

recordings of ethnographic field work or for archaeological research; recordings of theatre performances; educational and instruction films. Sometimes thematic collections exist in unexpected places: a regional German archive mentions a collection of 3,000 professional films on agriculture from former East Germany, whereas a corporate archive holds a small historical film collection on mining in the Netherlands. Some of these collections consist of several thousand hours of film, but most of them are small or very small. The impression one gains from the survey is of a patchwork of film collections all over Europe, not just in dedicated memory institutions but spread over a wide spectrum of different organizations.

Of all research institutes of the survey only about one third (11 respondents) have film, mostly small collections, with the exception of a historical research institute that holds nearly 3,000 films with interviews, newsreels, and some special film collections of international organizations. One would expect film to be more widely present in academic institutes as in pre-video times film was widely used by researchers for field recordings or documentation. Perhaps some of this research material subsequently found its way into heritage institutions, or is still outside any collection in the attic or cupboard of individual researchers; and inevitably some will not have survived.

The bulk of all film reported in the survey is held by the six broadcasters with film. As discussed above (pp.25-26), in the early days of television, film was used to shoot footage for newsreels and for pre-recording other programmes. The introduction of video in the late 1950s and 1960s did not immediately result in a switch to video as the equipment and the tapes were initially very expensive, and it took several decades before film was phased out.

Initially broadcasters did not keep large archives; many programmes were transmitted live and were not recorded at all. When in Belgium the first tv-programme went on air in 1953, there was no archive service. It took until 1956 before an archivist was hired, who immediately set himself to selecting the 'important' programmes from the previous three years. The main reason for setting up an archive was not so much a sudden awareness of the cultural value of the material, but a more practical one: when newsreels began to be transmitted on Belgian television in 1956, it was found that recycling footage from one's own film library for background information in news items was more efficient than reshooting similar scenes every time.[46]

Many of the broadcasters, especially the major national ones, today hold large film collections. From a survey by PrestoSpace in 2005 it appeared that the 31 broadcasters from 20 different European countries together had more than 4 million broadcast film items.[47]

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46 Alain Goossens, 'Belgian television archives history', 2005. URL: http://www.birth-of-tv.org/birth/assetView.do?lang=en&asset=114687_1117614646.

47 PrestoSpace, *Annual Report on Preservation Issues for European Audiovisual Collections*, 2005,

Only a few commercial companies in the survey have film and they are mostly companies for production, storage or distribution. The four private collectors have small collections of commercials, amateur recordings and documentary footage.

Outside the main categories there are a number of 'other' respondents that illustrate the diversity of film collections in Europe. A respondent specializing in art preservation holds 30 items of 16mm documentary film; a collection managed for a Ministry of Defense includes a substantial number of military films that go back almost a hundred years; and a public organization producing educational materials has 6,400 items of 16mm film, with documentary footage used for their own productions.

3.2.2 Size and expected annual growth

The total amount of film quantified by respondents is approximately 900,000 hrs (Table 3-2). As nearly one third of all film respondents do not quantify their collections, the actual amount of film held by all respondents together will be considerably higher.[48] Compared to respondents with audio or video, of which around 10% cannot give estimates, film respondents have far more trouble providing details on the size of their collections.

The lack of basic information is particularly widespread among libraries. Nearly half of all libraries with film cannot say how much they have. Amongst them are five national libraries, two of which serve as legal deposits in their countries.

The size of the individual film collections in the survey ranges from hundreds of thousands of hours to a few minutes. There are many small, some medium-sized and only a few large film collections (Figure 3-1). About 65% of the film respondents together hold just 1% of the total quantified amount, whereas the two largest collections (both broadcast archives) together have around 40% (350,000 hrs) (Figure 3-2). These very large collections have been excluded in further quantitative analysis when comparison would be compromised by their contribution to total figures.

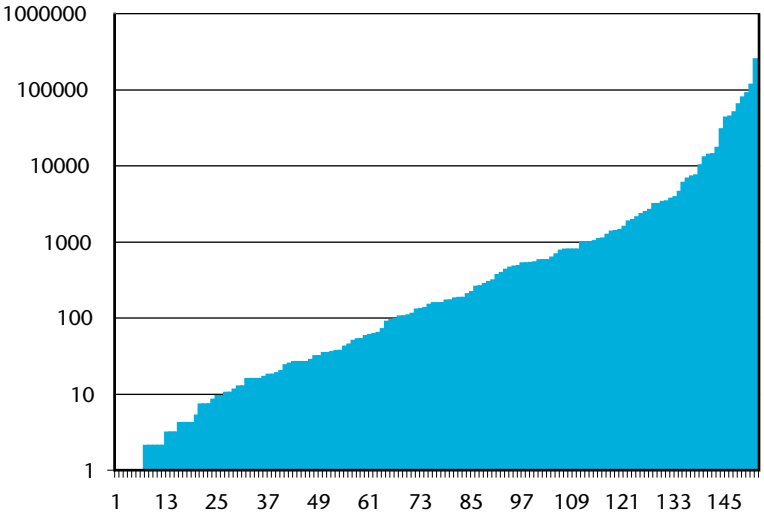
The average size of the film collections in the survey is about 3,600 hrs (excluding the two very large collections), which is four times smaller than the average audio or video collection.[49] The largest film collections are held by broadcasters and national audiovisual institutions, which all provide estimates of their holdings (whereas for audio and video the percentage of respondents that do not know how much is similar for all collection sizes.)

Deliverable D22-6, p.5. URL: http://www.prestospace.org/project/deliverables/D22-6.pdf.

48 We did not attempt to establish totals for all respondents, as extrapolation would be very complicated. Lack of data on collection size is more prominent among non-dedicated institutions that usually have smaller collections, but not restricted to them, the variation in collection size is substantial, and the data we have are sometimes inconsistent.

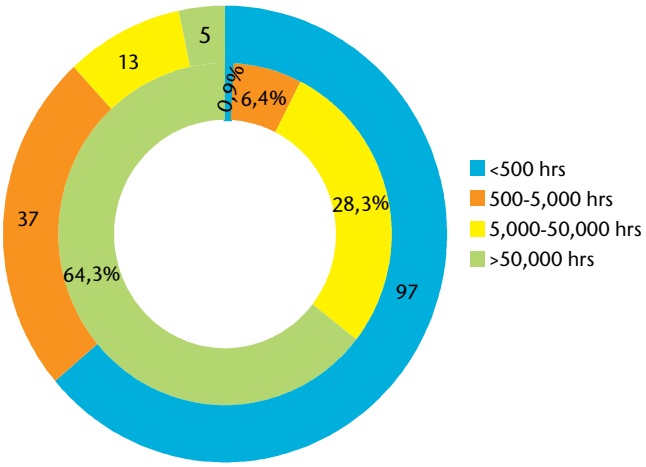
49 **Film: 3.6 x1000 hrs, excluding two largest collections; audio: 15.5 x 1000 hrs, excluding the four** largest collections; video: 13.1 x 1000 hrs, excluding the four largest collections.

Figure 3-1 Size of collections and amount of film



Number of respondents plotted against collection size on a logarithmic scale. The median value is 150 hrs, whereas the largest collection is 240,000 hrs. Includes all respondents that gave size estimates (152).

Figure 3-2 Amount of film in small, medium, large and very large collections



The outer circle represents the number of respondents with small, medium-sized, large and very large collections, the inner circle represents the share (%) of each of these classes of respondents of the total amount of film. The 97 respondents with collections < 500 hrs together hold 1% of all film materials, whereas the 5 largest collections together have 64% of the total amount. Includes all respondents with size estimates (152).

Of all 219 organizations with film about half expect their film collections to expand annually. There is a lot of uncertainty about the rate of growth; around 45% of the respondents that anticipate an increase cannot give an estimate. Those that feel a bit more certain together come up with about 10,000 hrs of film, or approximately 2% of their current collections. Compared to audio and particularly video, film respondents are less confident about predicting the annual expansion of their film collections.

Although memory institutions still expect their collections to grow with 3.3%, the other sectors predict an increase of only 0.3%, which results in a relatively low rate of growth for film collections overall. When the heritage role is less pronounced and the link to production environments is stronger (broadcasters, commercial companies, research institutes), the expectations for growth are low; obviously here the consequence of the replacement of film by (digital) video is felt immediately. Similarly, the legal deposits for film that characteristically receive a lot of new productions also expect a low increase.

Film formats

35mm 35mm is the common format for any professional film before the 1960s. It was introduced at the end of the 19th century and has been the industry standard in feature film production to this day. Until the 1950s cellulose nitrate was used as base, which is highly flammable and creates a preservation risk for some 35mm films. Acetate was used from the 1950s onwards, and in the 1990s polyester was introduced as a base.

16mm The 16mm format was introduced by Eastman Kodak in the 1920s as an inexpensive alternative to 35mm, with an acetate 'safety film' base instead of nitrate. Although initially aimed at the home market, 16mm was in fact widely used for different purposes. In WW II and in the post-war period there was a huge expansion of 16mm professional filmmaking. Thanks to the compact size and relatively low cost, 16mm was also adopted for use in professional news reporting, corporate and educational films. Films for government, business, medical and industrial clients created a large network of 16mm professional filmmakers and related service industries in the 1950s and 1960s. The advent of television also enhanced the use of 16mm film.[50] When portable video equipment was introduced in the 1970s, many users switched to video.

8 mm In the 1930s Kodak launched 8mm for the home market as a less expensive alternative to 16mm. Its follow-up, Super 8mm, was first sold in 1965 and used by both amateurs as well as professionals, as it gained some popularity among avant-garde film makers.[51]

9.5mm/Pathé Baby This format was introduced by Pathé in the 1920s as part of the Pathé Baby amateur film system. Pathé Baby was one of the first home film systems ever ('le Cinéma chez soi!'), initially developed as an affordable system to play copies of commercially produced films at home.[52]

50 Wikipedia, URL: http://en.wikipedia.org/wiki/16_mm_film.

51 *The Film Preservation Guide*. The basics for archives, libraries and museums, National Film Preservation Foundation, 2004, pp.7-8. URL: http://www.filmpreservation.org/preservation/film_guide.html.

52 Wikipedia, http://en.wikipedia.org/wiki/9.5_mm_film

3.2.3 Film formats

Of all three audiovisual media, film is the one with the least format changes throughout the years. The most frequently mentioned format in the survey is 16mm (see Table 3-3). Most 16mm in memory institutions dates from the 1920s through the early 1980s.[53] A slightly lower number of respondents have 35mm, the regular format for any professional film before the 1960s, and 8mm film. About one third of those who have 8mm do not provide details on the amounts that they hold. The average size of the 8mm collections in the survey is around 140 hrs, far below that of 16mm or 35mm collections (1700 and 2100 hrs, respectively).

Most 35mm (around 45% of total specified) is held in the national audiovisual institutions that collect feature films produced or distributed in their country, and in terms of hours these are relatively large collections. Broadcasters also hold large collections. Outside the main national institutions and broadcasting sector, still thousands of hours of 35mm are held by very diverse organizations that typically have a handful to a couple of hundred hours. Archives and museums have documentary, educational and – especially in the case of local and regional archives – promotional film. Libraries (except for national cinémathèques) have very little 35mm (some feature film and documentaries), but the picture of film formats found in libraries is very incomplete, as only half of the library respondents can give an estimate of collection size (Table 3-4) and of this total amount only half is further specified on the level of individual formats.

Collections of 16mm, of both professional and non-professional material (Table 3-4), are found in more institutions but on the average they are smaller in terms of hours; 8 mm is kept in even smaller quantities. The widespread use of 16mm for many different purposes is reflected in the variety of materials that respondents report. Regional and national, military and ethnographical museums hold 16mm collections ranging from 540 titles to 3 cans, mostly documentary film. In libraries we find collections of hundreds of hours of educational and instruction films on 16mm

Since the 8mm format was often used by individuals and organizations to make their own recordings, not meant for commercial distribution, these collections are likely to contain historically valuable material. Worldwide there is a large user community that takes interest in amateur small-gauge film production and its longterm preservation.[54] Some respondents with small-gauge collections actively collect and preserve home movies and amateur footage, and they hold unique historical visual documents that provide a glimpse of the private lives of

53 *The Film Preservation Guide*, p.7.

54 For instance AMIA (Association of Moving Image Archivists) has a special special interest group on amateur small-gauge film. See URL: http://www.amianet.org/groups/interest/smallgauge/about.php. In Europe the European Association Inedits is a group of professionals interested in the preservation, study and re-use of moving images produced by amateurs. See URL: http://www.aeinedits.org/en/.

Table 3-3 Amount of film material per type of carrier

	no. of resp.	known quantity	unknown quantity	amount (hrs x 1000)	% of total amount
35mm	96	86	10	179	46
16mm	110	101	9	172	44
8mm	92	62	30	8.9	2
Other	39	32	7	32	8
				391	100

'Other' includes 9mm, 9.5mm, 15mm, 17.5mm, 28mm, 32mm, 70mm and Pathé baby. Note that a substantial number of respondents only give a general size estimate for the whole of their film holdings and do not supply estimates per carrier. Consequently, the totals per carrier do not add up to the total for all film. NB: the two respondents with extremely large collections have been excluded here. For calculations, see Appendix A.

their national or local communities. Again, the variety of use is reflected in the presence of 8mm in many different settings. A research library that collects and preserves TV-documentaries, educational material and oral history testimonies for instance reports an 8mm collection of 480 titles.

Other formats occur in small quantities. 9.5mm, also known as Pathé Baby, is mostly found in France, but in the survey there are also organizations from the United Kingdom, Norway, Spain, France and Italy with 9.5mm film, in collections ranging from 80 to a few hundred titles. Small amounts of 9mm, 17.5mm, 28mm and 70mm film are also mentioned.

The large film collections held by broadcasters include substantial amounts of 16mm film, which was used a lot in broadcasting as it was cheaper than 35mm and easier to work with outside the studio.[55] These 16mm collections are likely to include historically interesting material, such as news items filmed on location, but the survey does not provide specific data on contents in relation to format.

55 Wikipedia URL: http://en.wikipedia.org/wiki/16_mm_film.

Table 3-4 Film formats per sector (hrs x 1000)

format	archives		libraries		museums		institutes		research institutes		broad-casters		commercial companies		private collectors		other		totals	
	no.	hrs	no.	hrs	no.	hrs	no.	hrs	no.	hrs	no.	hrs	no.	hrs	no.	hrs	no.	hrs	no.	hrs
35mm	50	107	9	13.2	13	36	8	3.4	4	0.3	2	9.9	4	0.6	1	0.1	5	8.0	96	179
16mm	61	56	9	2.3	15	23	7	2.6	6	1.1	2	80	3	0	2	0.6	5	6.9	110	172
8mm	55	6.8	6	0.4	14	0.4	7	0.9	3	0.3	0	0	1	0	2	0.1	4	0	92	8.9
other	19	2.2	6	1.1	3	0.4	6	0.3	1	0	1	26	0	0	1	0	2	1.7	39	32
Totals		172		16.9		59		7.1		1.7		116		0.6		0.8		16.6		391

Note that a substantial number of respondents only give a general size estimate for the whole of their film holdings and do not supply estimates per carrier. Consequently, the totals per carrier do not add up to the total for all film. NB: the two respondents with extremely large collections have been excluded here. For calculations see Appendix A.

3.3 Audio collections

3.3.1 Overview

Of the 374 respondents to the questionnaire, 326 have audio materials in their collection. Audio collections are found in all categories of organizations, and the distribution is very similar to that for the questionnaire as a whole (Table 3-5).

Archives that have audio materials are mostly local and regional archives with mixed collections. Around 20% of them are dedicated audiovisual archives, varying from (large) national institutions to smaller archives specializing, for instance, in a type of music, of a particular composer or a (broad) genre – among the respondents are archives for jazz, pop, opera, (light) dance music. Regional and municipal archives mention radio material (specifically news items) of local broadcasters and amateurs, oral history documents and interviews (relating to the history of the region, social issues or, in a few cases, specifically to WW II), recordings of meetings (of, for instance, the town council or political organizations), educational documents, material on dialects, music or local recordings, such as an archive in Central Europe that has 'the oldest gramophone records' (of the region).

In most cases there appears to be a clear relationship with the archives' general task of preserving records of the administration and/or the history of the city or region. In this perspective institutions are responsible for archiving records that, irrespective of carriers, belong together and thus audiovisual documents are archived with materials with which they share a context or provenance. The result is in some cases that a few dozen tapes (or even a handful) are kept in environment of textual and predominantly still paper documents. A few respondents indicate they intend to transfer their audio materials: 'we plan to displace them to (the national audiovisual archive)' a state archive writes of the several hundreds

Table 3-5 Audio respondents by sector

type of organization	resp. by sector		unknown amount		quantified amount		
	no.	% of total resp.	no. of resp.	% of resp. in sector	no. of resp.	hrs x 1000	% of total amount
archives	126	39	13	10.3	113	3226	34
libraries	74	23	4	5.4	70	1942	21
museums	35	10.7	5	14.3	30	85	0.9
institutes	23	7.1	7	30	16	109	1.2
research institutes	25	7.7	1	4.0	24	142	1.5
broadcasters	17	5.2	2	11.8	15	3724	40
commercial companies	8	2.4	2	25	6	27	0.3
private collectors	9	2.8	0	0	9	116	1.2
others	9	2.8	4	44	5	15	0.2
total	326		38		288	9386	

compact cassettes they hold. For many archives, however, such transfers are problematic as they would dissociate the audio recordings from their context.

Not surprisingly, the deposit libraries that hold all materials 'published' in a country are among the largest audio collections in the survey, with tens or even hundreds of thousands of hours of material of all kinds. In academic music libraries, sound recordings are brought together with other materials for the study of music and its history, such as sheet music, books, journals and other related materials. Their orientation differs from multimedia centres of educational institutions and 'médiathèques' that have a variety of educational materials and music on loan. The latter have been set up to support teaching and have a strong emphasis on services, with collections created for present-day use.

For many respondents, sound recordings are mostly supplementary materials that support or illustrate aspects of the collection. Interviews are mentioned frequently, with artists, theatre makers, photographers, writers, literary critics, or with informants who speak about regional culture and history. Several museums mention specifically oral documents relating to WW II and the Holocaust, while an institute for labour history not only has interviews but also songs and music from the labour movement. Recordings of theatre, ballet and opera performances and concerts are found in music academies, cultural institutes, and theatre museums. An institute for literature specifically mentions radio plays as an important category in its collections. A museum for mail and telecommunication lists its collection of commercials, a museum of contemporary art states it has artists' 'soundworks'. A special category are film museums that have sound tracks of film, as separate items in their collections.

A number of museums and (research) institutes specialize in ethnography and ethnomusicology, and audiovisual documents are a central part of their holdings. They have sound collections – sometimes very substantial – of traditional music, interviews with musicians, stories, and oral history documents on traditions and customs, often resulting from their own research and field work. Research institutes for folklore and ethnography usually also have tapes with dialect materials or minority languages, but more extensive collections of spoken language are found in institutes for the national language that exist in some countries. The majority of responses are from institutions that focus on the music or language of their own country, but this is not always the case: institutes may hold field recordings made by researchers in very different parts of the world which sometimes go back many decades.

The broadcasters in the survey hold enormous amounts of materials, but it should be borne in mind that archives of broadcast materials may also exist elsewhere, when there are legal requirements for deposit of broadcast materials in (public) institutions. Especially at local and regional level there are many cases

in which local/regional broadcasters are somehow associated with the archives in the region because of a joint interest in local events, culture and history. Apart from commercial local radio stations that mostly broadcast music programmes, there are also (semi)public stations that have been established as a platform for local concerns and interests. As social and cultural agencies they connect with the city's administration as well as with its archive, and several local/regional archives mention they hold materials deposited by local radio stations. The mass of radio materials, however, is held by the national broadcasters and broadcasting archives themselves and includes both original recordings used for programmes and recordings of individual programmes themselves. To have a representative record of broadcasting, including live transmissions, commercials, announcements, phone-in responses from the audience etc, some audiovisual archives also record off-air, capturing for instance all transmissions for a number of days per year. Such recordings are not so much an archive of the productions of broadcasters but are relevant for the study of the history of media culture.

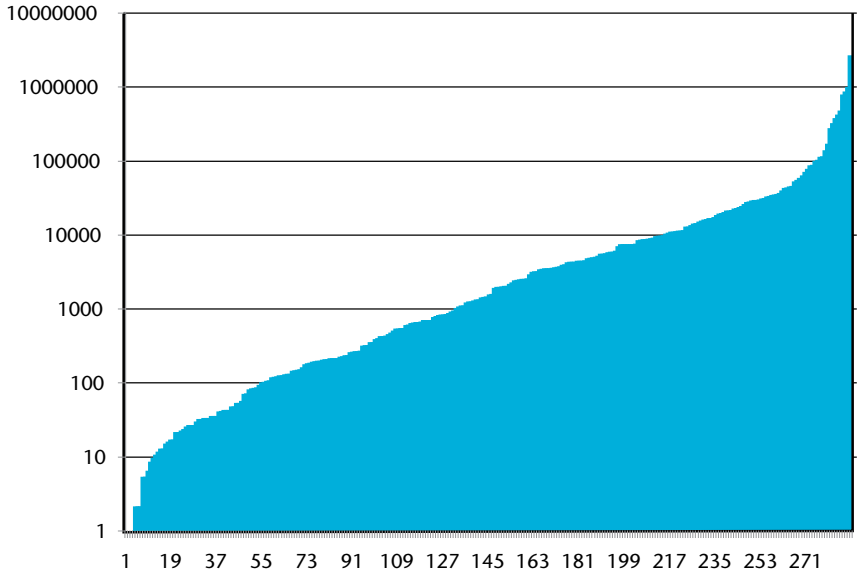
Respondents from commercial companies are mostly from the world of film production and distribution; they have small collections of sound tracks and documentation. The category 'others' includes educational centres and administrative services that, for instance, record meetings of government bodies and sessions of parliament. In this category there are also a few organizations that collect or manage media art.

3.3.2 Size and expected annual growth

The distribution in terms of size confirms the general picture of many small collections (of a few hours to several hundred), scattered over a wide variety of institutions, and a relatively small number of very large collections (Figure 3-3). Of all respondents with audio, almost 12% do not give an estimate for the total size of their audio collections, although in some cases they do give estimates for certain types of materials. A third of respondents have less than 500 hours of audio. Those with more than 50,000 hours are mostly major broadcasters and institutions with a task in collecting and preserving audio material, at national or regional level, sometimes through deposit regulations. However, this group also includes a general music library, a museum with music collections for research, and a private collection.

Comparing different types of organizations, it appears that libraries can offer more information on the size of their collections than others. This may partly be due to the fact that this group includes media centres and music collections for use and loan by the general public and students – which would require good bibliographic control –, partly to the presence of a number of national (deposit) libraries in this group, which have traditionally focused strongly on cataloguing.

Figure 3-3 Size of collections and amount of audio



Number of respondents plotted against collection size on a logarithmic scale. The median value is 1,340 hrs, whereas the largest collection is 2.5 million hrs. These data include all respondents that give size estimates (288).

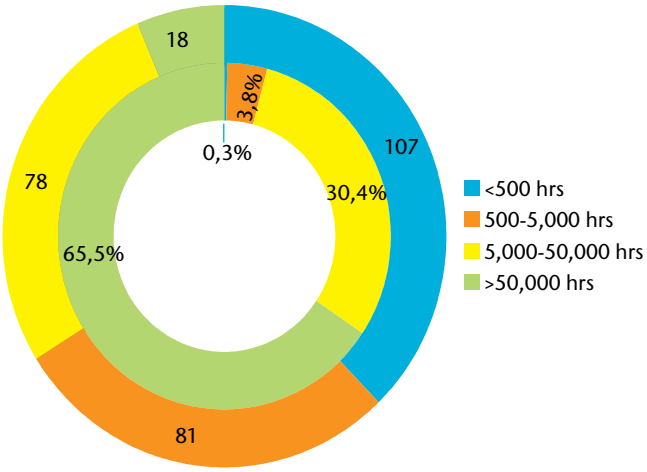
Obviously, the proportion of larger collections is highest among broadcasters; libraries come second, which may be ascribed to the large deposit and music collections found in libraries. The total number of hours in the 288 audio collections for which estimates were given is around 9,4 million. Around 5 million of this is held by only four deposit and broadcast collections with more than 500,000 hrs (Figure 3-3). As these four collections by their size have a disproportionate effect on figures on distribution of materials by type of institution or by carrier, we have left them out in the quantitative analysis below.

The total amounts held in small collections constitute a very small part of the whole: all 107 respondents with collections up to 500 hrs, representing a third of all audio respondents, together hold only 0.3% of the total of audio materials. Without the four largest collections the amounts of materials held by the different size groups are as shown in Figure 3-4.

Disregarding the extremely large collections, the average collection size overall (excluding the collections of unknown size) is 15,500 hrs; in libraries, the memory institutions holding most materials, the average is 28,000 hrs (1.9 million hrs for 70 respondents, cp. archives with 6,700 hrs or 750,000 hrs for 112 respondents). The median value for all audio collections with size estimates is 1,340 hrs.

Of the audio respondents, 75% indicated they expect their collection to grow.

Figure 3-4 Amount of audio materials in small, medium, large and very large collections



The outer circle represents the number of respondents with small, medium-sized, large and very large collections, the inner circle represents the share (%) of each of these classes of respondents of the total amount of audio materials. Of the 288 respondents, 107 have less than 500 hrs each. Together these small collections amount to 0.3% of all audio materials, whereas the 18 very large collections have 65.5%. NB These figures are for 284 respondents, excluding the 4 largest collections that together have almost 5 million hours.

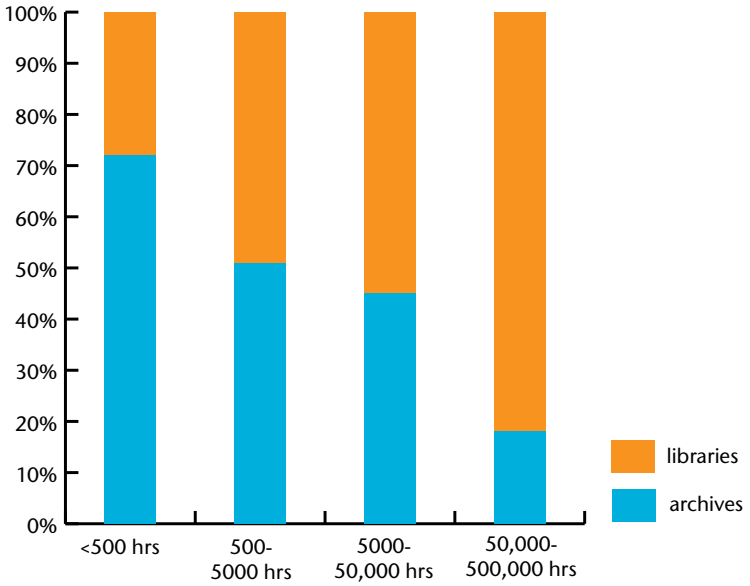
Of these, 69 (30%) do not give an estimate of the increase per year. The others together (excluding the four extremely large collections) specified a yearly total growth of around 57,000 hrs which represents a growth rate of approximately 1.3%. If we extrapolate and apply this percentage to all respondents that expect an increase (including those who do not say how much), the amount of audio material in our response group would grow by around 78,000 hrs per year.

Uncertainty about what to expect is particularly strong among archives: almost 40% of those who indicate their collection will grow cannot estimate by how much, whereas all broadcasters can put a figure to the annual growth of their collections. The growth rate for broadcasters is in the area of 0.5% per year, which is a low percentage compared to other respondents; in absolute terms, however, the increase of such huge collections is still substantial. For libraries and archives the growth rates are similar (around 1.4%), but in absolute terms the ten largest (deposit) collections in libraries account for most of the material that is added to collections every year.

3.3.3 Audio formats

For the analysis of size of audio collections in terms of specific carriers, we have excluded the four extremely large collections to give a more balanced picture of distribution.

Figure 3-5 Comparison of amount of audio held in archives and in libraries



Percentage of audio materials in small, medium, large and very large collections compared between archives and libraries. The total in archives is appr 750,000 hrs for 112 respondents, in libraries 1.9 million hours for 70 respondents. Figures exclude the extremely large collections.

The first thing that should be noted is that a considerable number of respondents who indicate they have audio materials do not provide replies to the question on formats. Others give an estimate of the size of their total collection whereas their answers in the question on formats add up to a much smaller amount and obviously cover only part of their collection. The overall picture on specific formats that emerges from the survey is therefore very sketchy.

For the 326 audio respondents, the highest number of answers on specific carriers is 242, for compact cassettes (Table 3-6). Of these respondents around 20% (54) explicitly state they cannot give an estimate. An additional 11 respondents state they have no compact cassettes. It is highly likely that among the remaining 73 audio respondents there are also a number that have cassettes, and the same applies to other common formats like open reel tape and microgroove disks (LPs).

For less current formats, like cylinders, shellacs or instantaneous disks, it is probable that many organizations do not have any. For these older materials one would expect a higher proportion of respondents to know how much they have, because they have been part of their collections for a considerable time or because they pose specific problems for preservation and access. As no such correlation

Table 3-6 Audio collections per carrier

	no. of responses	known quantity	unknown quantity	amount (hrs x 1000)	% of total amount
cylinders	70	40	30	1.4	0.03
coarse groove replicated disks ('78s','shellacs')	107	80	27	85	1.9
instantaneous disks of any kind	66	34	32	8.8	0.2
microgroove disks (LPs)	162	127	35	774	17.5
open reel magnetic tape	208	170	38	1702	38.6
compact cassettes	242	188	54	908	20.6
R-DAT	106	70	36	112	2.5
replicated CDs, DVDs	180	131	49	730	16.5
recordable and rewritable CDs, DVDs	140	92	48	61	1.4
miniDiscs	82	46	36	18.2	0.4
other	52	28	24	11.9	0.3
total				4413	100

Note that a substantial number of respondents only give a general size estimate for the whole of their audio holdings and do not supply estimates per carrier. Consequently, the totals per carrier do not add up to the total for all audio. NB: the 4 respondents with extremely large collections have been excluded here. For calculations, see Appendix A.

was found, one is tempted to conclude that in some organizations materials are kept but not actively managed to ensure continued access.

It is striking that for what is generally considered the most at-risk material, instantaneous disks, the percentage of respondents that do not know how much they have is the highest of all formats (almost 50% of respondents to this question). The group of respondents with instantaneous disks is too small for the percentages to be very meaningful, but for a material widely known to be in a precarious condition, one would expect *all* those who hold such disks to have assessed their collection. A possible explanation is that some who are not familiar with handling these less common and fragile carriers would rather not touch them at all, for fear of causing damage.

In terms of amount in hours, cylinders and instantaneous discs, which can only hold fairly brief recordings, may not constitute a significant share of the total audiovisual heritage. However, because many of them are unique recordings it is a matter of concern that knowledge about their existence is so incomplete.

When we look at the distribution of carriers as related to to type of organization, we see for instance in research institutes a high proportion of formats that individual researchers can use to make their own recordings (Table 3-8). Open reel tape and compact cassettes, traditionally used a lot for field recordings, interviews etc., together with CD-R(W) and DVD-R(W) constitute around 85% of the audio holdings. Some also hold cylinders and instantaneous disks.

In archives we see a similar predominance of open reel tapes and compact cassettes (together around 70% of the audio holdings in archives); mechanical

Instantaneous disks

Instantaneous disks (also called direct-cut disks) are recording media made of a variety of materials. They were widespread mainly in radio stations before the advent of magnetic tape to record and replay signals from the same disks without the need for galvanoplastic processing and pressing (the industrial process for production of audio disks for (commercial) distribution). Their surfaces are soft enough to permit the cutting of the groove, and hard enough to permit a number of replays. Most of these disks are unique recordings.

The most widespread type of instantaneous disks are lacquer or so-called 'acetate' disks. A lacquer coating mainly consisting of nitrate cellulose carries the information. The substrate of the disks is generally from metal, some are of glass. The lacquer coating becomes brittle with age and shrinks, thereby often crackling and flaking off the substrate. Lacquer disks still in good shape may crackle at any moment. Many other materials, waxed card board, zinc, gelatine, etc. have been used for instantaneous disks. All should be considered to be at great risk. [adapted from Dietrich Schüller, *Audio and Video Carriers*, 2008, http://www.tape-online.net/docs/audio_and_video_carriers.pdf]

disks (78s and LPs) make up 17% of the total (Table 3-8). Because many archives receive materials some time after they were first produced, obsolete carriers proportionally make up a larger share of their collections. Archives also have less recent commercially produced material: replicated CDs and DVDs constitute 16% of the total audiovisual holdings (for all respondents), but in archives they are only 2% of the total.

Commercially produced materials like microgroove disks (LPs), replicated CDs/DVDs and 78s are found mostly in library collections, which can be ascribed first and foremost to the effect of the large deposit collections of materials for commercial distribution, and also to some extent to that of 'médiathèques' and music lending libraries.

For the whole audio population, open reel tape is the dominant format primarily because of the impact of broadcast collections. In broadcast collections the oldest formats (cylinders, 78s, instantaneous discs) are present only in minimal quantities (relatively), and LPs and compact cassettes also take up a small share. Broadcasters do not usually regard commercially produced carriers as their own archives but keep them in their music libraries, separate from their own recordings. It is therefore likely that responses from broadcasting only provided information on the archives, not on the music library. In fact, one broadcast respondent explicitly stated so, adding that the broadcaster's music library has many million commercially produced disks (78s, LPs, CDs) in addition to the material kept in the archive. In most countries the preservation of these disks would be the responsibility of the heritage institution in charge of deposit collections.

Cylinders

The first recording system was the cylinder phonograph, invented by Thomas A. Edison in 1877, improved and marketed from 1888 onwards. Originally intended as an office device for dictation purposes, it became popular for scholarly recording of language and ethnic musics, for which it was used until the 1950s.

Cylinders were also used by the phonographic industries for pre-recorded music. This format, however, was less successful than the gramophone disc and vanished from the market in the late 1920s.

With all mechanical carriers, the sound, which is a function of the variation of air pressure, is transformed into movements of a cutting stylus and engraved into the surface of a rotating medium. With cylinders the grooves are arranged across the surface. The modulation of the sound signal is engraved vertically ('hill and dale').

There are self-recorded and replicated cylinders. Self-recorded cylinders always consist of 'wax' in any of several possible chemical compositions. Replicated cylinders were made either by copying from masters (which allowed for only a limited number of copies), or from a galvanoplastic negative, a copper tube, which carried the 'inverted' groove at the surface of its inner side. From these negatives casts were made in wax or celluloid (= nitrate cellulose) positives were produced under high pressure of hot steam. The celluloid tube was supported by a plaster core for sufficient stability.

The many wax compositions used for wax cylinders are chemically fairly stable, if properly stored. Wax, however, is highly susceptible to fungus growths, and as many cylinders have been inadequately stored in their earlier lives, a typical storage artefact is fungus. Celluloid cylinders suffer from brittleness of the nitrate cellulose surface, but the catastrophic deterioration known from nitrate film is not commonly seen. Mechanically, all wax cylinders as well as the plaster cores of celluloid cylinders are extremely fragile. [adapted from Dietrich Schüller, *Audio and Video Carriers*, 2008, http://www.tape-online.net/docs/audio_and_video_carriers.pdf]

Obviously, the size of broadcast collections is many times that of heritage collections: whereas the average size for open reel tape for all respondents is 9,000 hrs, for broadcasters it is 84,000 hrs; around 80% of the total amount that they hold is on open reel tape. Because of these huge quantities, the bias in formats with broadcasters has a strong effect on distribution for the whole population. If we exclude broadcasters, the picture of distribution of formats changes: then compact cassettes, the carrier mentioned most frequently by audio respondents, make up more than a quarter of the total number of hours, followed by microgrooves, which are found in fewer collections but on the average in larger numbers.

Among the 'other' formats, respondents specify 'magneto-optical disks', wire, SLR computer tape, and 650 items of ampex tape.

3.3.4 Original materials and copies

In developing preservation policies for the audiovisual heritage it is important to establish how much of the materials are original and unique recordings that are not held elsewhere. Obviously every organization in principle aims to keep its collection accessible over time. A music library that only has mass-produced microgroove disks, audiocassettes, and CDs and that serves the students of a music academy will take measures to extend the useful life of the collection. An institute that records radio programmes off the air may thus bring together materials that are unique and valuable as a collection because of the focus, the level of documentation and the interrelationships with other materials. Such a collection may provide the best point of entry to a certain field, the more so if the originals are kept by several different creators, for instance broadcasters, and if they are not easily accessible. In fact, a large part of the audiovisual heritage has survived only as copies as the creators who owned the master recordings did not keep them or ceased to exist. The system of deposit and national audiovisual archives was set up precisely because producing audio recordings and preserving the (national) audiovisual heritage are quite distinct activities.

On the one hand, then, preservation is aimed at collections kept by an institution in which they fulfill a certain function, which may justify investing efforts also in preserving copies, especially if they were not mass-produced for wide distribution or if the originals are inaccessible for research. On the other hand, in selecting for preservation, a recording that is a unique original usually moves up in the list of priorities. To assess the scope of preservation programmes it is therefore relevant to know how much material consists of original recordings.[56]

We asked audio respondents to indicate the percentage of their holdings that are original recordings made by or for their own organization. Of all respondents, 180 state they have such recordings. Relating the percentages they give to the size of their collections, it appears that a total of 5.1 million hours (or 54% of the total 9.4 million) consists of original recordings, of which almost 90% is held by broadcasters, production companies and the four respondents with extremely large collections. The total amount of own recordings held in the remaining organizations is approximately 350,000 hrs (of the 1.7 million hrs in their care, or 20% of their total holdings) (Table 3-7).[57]

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56 Original recordings and unique recordings are not always the same: of original recordings made in production companies, many copies may exist, and a copy may be a unique recording if it is the only copy left. However, in the heritage sector most original recordings have not as a rule been widely copied, and the organization that made the original recording would usually assume responsibility for preservation of the content. It is likely that many organizations, apart from their own recordings, hold other unique materials, that were transferred to them by the creator. We asked about original recordings because we expected institutions would find it easier to establish the amount of recordings that they had made themselves, as it would often be impossible for them to know whether materials had perhaps been copied at some point in their life.

57 It should be borne in mind that several respondents give a percentage for own recordings but

The percentage of respondents with own recordings is lowest among libraries; those that do make recordings are mostly associated with educational institutions and, for instance, create audio materials for language teaching or record students' concerts (at music academies). A few (national) libraries record interviews or traditional music. The sector as a whole has huge responsibilities for preservation of audiovisual materials, but of 'published' materials, not original recordings.

The very high percentage for the group of 'other' is due to the activities of a few organizations with the specific task of recording and archiving sessions of parliament or meetings of governmental bodies. As their audio collections consist almost exclusively of this type of material, the percentage of own recordings comes out close to 100, but the data for this category are unstable as several respondents in this small group could not quantify their holdings.

Research institutes consistently have the highest proportion of original recordings, in that most of them make recordings themselves and these recordings constitute the bulk of their holdings: 15 out of 24 have more than 80% own recordings. Much of this was collected through field work in ethnography, ethnomusicology, folklore, dance, literature and linguistics. Often these institutes are associated with a university or an academy of science, and most of them focus on national dance, language, literature and dialects, and music.

In the survey the category of research institutes includes only academic institutes that employ researchers, but outside this group research materials are found in other institutions as well. Some of the museums and archives no doubt also have their own recordings of music, dance and languages kept as research materials. Overall, the recordings made by institutions themselves largely fall into three categories:

1. documentation of performances, events, activities, interviews etc relating to the field in which the organization specializes, mostly cultural(-historical) materials for a general public;
2. materials collected as primary sources for research, often in fieldwork, documenting language, customs, dance and music;
3. registrations of meetings and activities relating to government and administration.

Although these classes of recordings do not completely coincide with categories of institution, institutes and archives tend to make more recordings of the first type and research institutes of the second. The third type is made by some archives and special audiovisual units of government bodies. Collections of the first type are regularly supplemented by off-air recordings of radio programmes

do not quantify their holdings. The number of hours therefore relates only to those who also give estimates for the size of their collections.

(interviews, documentaries, literature readings) that some institutions will perhaps have counted as own recordings (although they cannot be considered *original* recordings). Few institutions explicitly mention off-air recordings but if they have, for example, interviews with politicians or famous actors, in many cases they presumably recorded these from radio or television. On the other hand it is striking how many respondents mention they are involved in specific projects in which they create their own audio documents, for instance for oral history, so no doubt the amount of original recordings is indeed substantial.

Table 3-7 Audio recordings made by institutions themselves

	archives	libraries	museums	research institutes	institutes	other	total
total no. of respondents	126	74	35	25	23	9	292
no. (%) of resp.ondents with own recordings	70 (56%)	24 (32%)	21 (60%)	21 (84%)	12 (52%)	7 (78%)	155 (53%)
total hrs held by resp. with own recordings x 1000	513	926	68	138	44	14.6	1704
total hrs own recordings x 1000	99	40	61	117	18.6	14.1	350
% of all materials held by resp. with own recordings	19.3	4	90	85	42	97	20.5
total hrs held by all resp. in this sector x 1000	620	1942	85	142	109	14.6	2914

NB Inconsistencies between numbers and percentages occur because 10 respondents indicate they have a certain percentage of own recordings but cannot not give an estimate for the total size of their holdings.

Table 3-8 Audio carriers per sector (hrs x 1000)

carriers	archives		libraries		museums		institutes		research institutes		broad-casters		commercial companies		private collectors		other		total	
	no.	hrs	no.	hrs	no.	hrs	no.	hrs	no.	hrs	no.	hrs	no.	hrs	no.	hrs	no.	hrs	no.	hrs
cylinders	13	0.1	13	0.2	7	1.0	1	0	3	0.03	0	0	1	0	2	0	0	0	40	1.4
78s	29	23	25	39	5	0.3	6	1.9	6	0.3	0	0	1	0.02	8	21	0	0	80	85
instant. disks	16	3.9	9	1.0	1	0.01	1	0.04	2	0.9	1	0	1	3.0	3	0.01	0	0	34	8.9
LPs	42	105	41	568	14	5.3	12	39	6	4.3	3	31	2	6.3	7	14.4	0	0	127	774
open reel tape	75	385	25	118	20	67	9	20	17	84	12	1002	4	8.6	6	8.3	2	8.3	170	1702
cassettes	78	140	43	679	24	7.7	10	3.6	17	20	4	38	2	0.7	6	16.0	4	3.8	188	908
R-DAT	30	38	10	47	3	0.4	6	7.0	8	6.7	9	13.0	1	0.02	3	0.3	0	0	70	112
replicated CDs, DVDs	29	15.1	51	455	16	2.0	11	35	7	5.6	9	164	1	0.02	6	53	1	0.08	131	730
CD-R(W), DVD-R(W)	36	18.9	12	13.7	7	1.1	6	1.2	13	13.0	8	3.9	4	4.5	3	2.1	3	2.4	92	61
miniDiscs	17	10.0	11	2.0	5	0.6	1	0.2	6	0.7	3	3.9	0	0	2	0.8	1	0	46	18.3
other	13	2.5	3	6.8	4	0.01	1	0.5	3	2.0	1	0	2	0.2	0	0	1	0	28	12.0
total		741		1945		85		134		138		1256		23		116		14.6		4413

Note that a substantial number of respondents only give a general size estimate for the whole of their audio holdings and do not supply estimates per carrier. Consequently, the totals per carrier do not add up to the total for all audio. NB: the four respondents with extremely large collections have been excluded here. For calculations, see Appendix A.

3.4 Video collections

3.4.1 Overview

About 80% of all respondents have video, a slightly lower number than for audio, but much higher than for film. In terms of estimated number of hours, video is the largest media type (appr. 10,5 million hrs). The video collections in the survey are generally larger than those of audio and in particular film. Over two-thirds of all video respondents are from memory institutions. Although there are only a few respondents from broadcasting, their video collections add up to about a third of the grand total for video.

There is a close relationship between video and film. For one thing, feature films are often distributed on video, and many film institutions have a video library of their film holdings. Especially institutions with documentary materials will often have viewing copies on video of holdings that they transferred to a specialized film archive for optimal storage. This is common practice also because over the past decades anyone could operate a VCR whereas film projectors are more difficult to handle.

Unlike for film and audio, institutions specializing in video are extremely rare, with the exception of those for media and video art. Most of the video mentioned in the survey does not represent unique material: the content is either available as an original film, or it concerns one of many video copies that are widely spread across institutions. Moreover, video is used on a wide scale to record TV programmes, which also results in overlap between collections: about a third of all video held by the institutions outside the broadcasting sector consists of recordings of TV programmes (Table 3-9).

Table 3-9 Video recordings of TV programmes

type of organization	no. of responses	TV programmes as % of collections
archives	81	29
libraries	43	25
museums	22	23
institutes	15	29
research institutes	11	23
commercial companies	4	39
private collectors	5	78
other	10	18.6
total	191	

Excluding respondents from broadcasting. Relating the average percentage for each sector to the amount of material they hold we calculated that outside broadcasting around a third of the material consists of tv recordings (2.2 out of 6.8 million hrs).

About 40% of all video respondents are archives (Table 3-10), half of which have collections of 500 hrs or less. They have film documentaries, folklore and oral history interviews, recordings of local or regional events, amateur videos, television recordings, educational material, recordings of council or parliamentary meetings, literary readings, product demonstrations, feature films, and recordings of theatre performances. Some music archives have recordings of concerts, interviews and festivals on video.

About 25% of all video is held in all kinds of libraries, from specialized audiovisual libraries ('médiathèque', 'filmoteka') to academic research libraries, and the type of collection varies with the type of library. National libraries serving as legal deposits have anything published or produced in their country, both fiction and non-fiction, and in some cases they also have broadcast recordings. Thematic and specialized libraries usually have video collections related to the subject on which they focus, including recordings of TV programmes, documentaries and oral history materials. University libraries also have recordings from field research and teaching material on video. Some of the smaller libraries have commercially produced videotapes of feature films.

Museums do not have a lot of video: the museum respondents in the survey have small collections of documentaries, drama, interviews, theatre performances, recordings of concerts, feature films and educational material. Some ethnographic museums have video recordings resulting from field work, and in the collections of art museums video art is found.

The broadcasters have large quantities of news, documentaries, drama, entertainment on video, most of it their own recordings of TV programmes.

Table 3-10 Video respondents per sector

type of organization	resp. by sector		unknown amount		quantified amount		
	no.	% of total resp.	no. of resp.	% of resp. in sector	no. of resp.	hrs x 1000	% of total amount
archives	116	39	16	13.8	100	1722	16.3
libraries	70	23	3	4	67	2887	27
museums	39	10.7	6	15.4	33	37	0.4
institutes	25	7.1	3	12.0	22	81	0.8
research institutes	24	7.7	3	12.5	21	22	0.2
broadcasters	10	5.2	1	10.0	9	3720	35
commercial companies	8	2.4	1	12.5	7	2005	19.0
private collectors	6	2.8	1	16.7	5	16.8	0.2
others	14	2.8	1	7.1	13	66	0.6
total	312		35		277	10,559	100

3.4.2 Size and expected annual growth

Just as film and audio respondents, institutions with video do not all provide information on the size of their video holdings. Some 10% do not even give a rough total estimate of the size. Of the 10.5 million hrs of video specified by 277 respondents, around 8.8 million hrs is subdivided further into individual formats, with some 2 million hrs left that is only listed in very general terms. Here too there appears to be a connection between lack of exact data and inadequate cataloguing: 'on the basis of the current registration the format cannot be determined', one city archive says. The institutions that explicitly indicate they do not know how much video they have, report a higher cataloguing backlog than the average for all video respondents. Exploring the 'great unknown' across all sectors, we found that it is more prominent in archives and museums, and even a little more in the case of video than of audio or film collections.

Although there are slightly more audio than video respondents, the amount of video quantified in the survey is the highest for all three media. The data on video collections roughly show the same tendencies as audio and film, with if anything an even more pronounced concentration in a small number of very large collections: over 90% of all video is in the care of only 14 institutions with collections of more than 50,000 hrs (Figure 3-7). This group includes broadcasters, national audiovisual institutions, and deposit libraries. The group of those with video collections under 500 hrs is the largest and as in the other cases they together hold less than 1% of the total amount quantified (excluding the 4 extremely large collections, Figure 3-7). The average collection size, disregarding the 4 extremely large collections that together hold 7 million hours, is 13,100 hrs, which is of the same order as the average for audio.

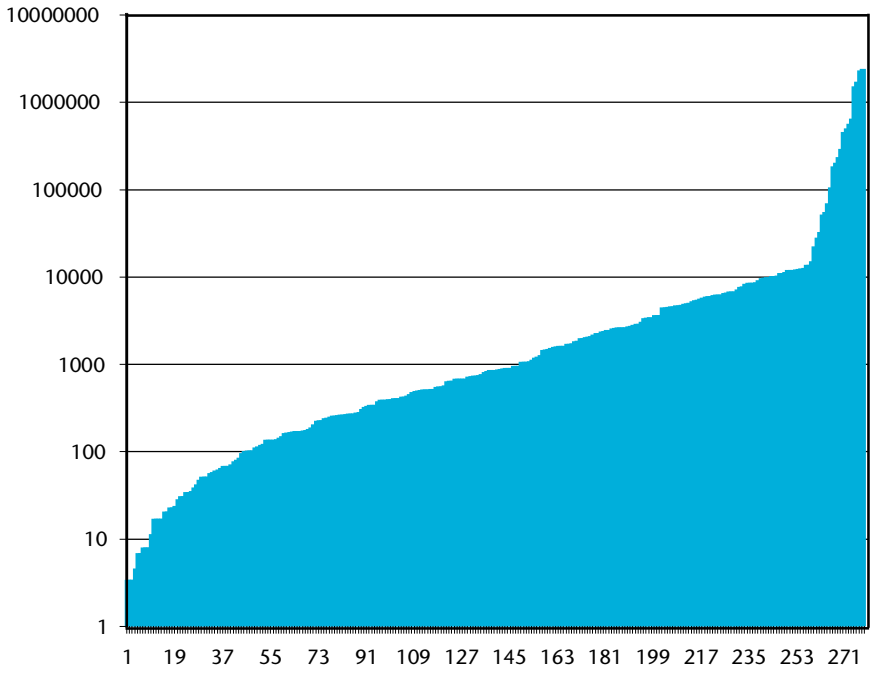
Expectations on the growth of the video collections are quite high. About 80% of all video respondents predict that their collections will increase the next few years. Whereas a third of these do not provide an estimate of the pace of growth, the others anticipate an annual increase of nearly 6%, or more than 200,000 hrs. This percentage is considerably higher than those for audio and film.

3.4.3 Video formats

When respondents are asked to quantify their collection on the level of individual video formats (VHS, U-matic, etc.), the general picture that emerges is that many institutions do not have data on the presence of different carriers. Overall, in almost 30% of the cases, respondents indicate they do not know how much they have of a specific format, either in titles, items or hours (Table 3-11). The more often a format is mentioned, the higher the percentage of respondents that do indicate the amount they have.

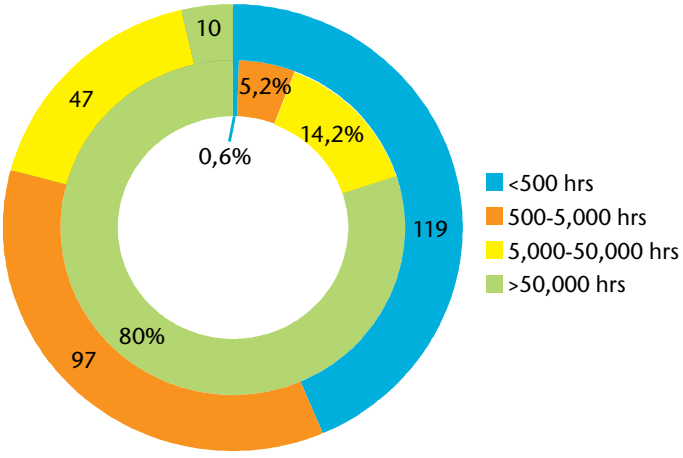
The lack of knowledge on the size of the video collections on the level of formats is most evident in research institutes (Table 3-12). In over 40% of all cases

Figure 3-6 Size of collections and amount of video



Number of respondents plotted against collection size on a logarithmic scale. The median value is 750 hrs, whereas the largest collection is 2.1 million hrs. These figures include all respondents that give size estimates (277).

Figure 3-7 Amount of video in small, medium-sized, large and very large collections



The outer circle represents the number of respondents with small, medium-sized, large and very large collections, the inner circle represents the share (%) of each of these classes of respondents of the total amount of video materials. The 119 respondents with collections < 500 hrs together hold 0.6% of all video quantified. NB These data are for 273 respondents that give size estimates, excluding the 4 extremely large collections (>500,000 hrs, total around 7 million hours).

Video formats

VHS (Vertical Helican Scan, or Video Home System) found its way to the consumer and (semi-)professional markets in the middle and late 1970s and soon became the *de facto* video standard after winning the battle with Sony Betamax. It is frequently used to record TV programmes and home movies, but also for commercially produced films.

S(uper)-VHS is a continuation of VHS at higher quality. Introduced in the late 1980s, it was primarily geared towards consumer, industrial, and educational markets.[58]

U-matic (also called 'three-quarter-inch' after the width of the tape) was developed in the late 1960s. Because of its flexible editing capacities it soon gained ground with broadcasters as a cheap alternative for one-inch tape. It was frequently used for short news items.[59]

Betacam SP ('Superior Performance'), introduced in the 1980s, was the professional variety of the consumer-oriented Betamax. Beta SP was the industry standard for most broadcasters and high-end production houses until the late 1990s. Because of its high quality it is considered to be a suitable archival format.

Betacam Digital ('Digibeta ') was launched in the 1990s and superseded both Betacam and Betacam SP. Providing high-quality images at a relatively low cost compared to other professional or broadcast formats it gained a considerable share in the professional market, in particular the broadcasting sector.

Video8/VideoHi8 Video8 was introduced in 1985 and superseded by VideoHi8, an improved version of the same format. Both analogue video formats were predominantly targeted at amateur camcorder users. As the cassettes were smaller than VHS and Betamax, Video8 became very popular in the consumer market. Currently both Video8 and VideoHi8 are rapidly being replaced by Digital8 (initially offering backward compatibility) and mini DV (now strongly dominating the consumer market).

they fail to supply data on the amount of a specific format. The archives in the survey, to a lesser degree, show a similar trend. As we concluded earlier, the inability of respondents to produce exact data on their collections is closely related to inadequate documentation, as some of them clearly indicate in additional comments: 'Our registration does not include qualification for format', 'Video collections have not been organized nor catalogued' or – even more significant – 'Much of this is still in boxes' (which also makes one wonder where the boxes are actually stored, given the well-known sensibility of video materials to high and/or fluctuating temperature and humidity).

58 See Texas Commission on the Arts, *Video Identification and Assessment Guide*, 2004, URL: http://www.arts.state.tx.us/video/ for comprehensive overview.

59 George Boston (IASA), *Survey of Endangered Audiovisual Carriers*, UNESCO, 2003, p.6. URL: http://portal.unesco.org/ci/en/ev.php-URL_ID=13437&URL_DO=DO_TOPIC&URL_SECTION=201.html.

By far the most popular video format in the survey – both in terms of collection size as in number of respondents – is VHS (Table 3-13). Almost 90% of all video respondents have VHS in their collections. Together they quantified some 6 million hrs, with large contributions from some legal deposit libraries. Most VHS are either published, commercially produced tapes (usually of feature films or documentaries) or tapes with own recordings of TV programmes. Thematic and specialized institutions mention large VHS collections with TV programmes that relate to their field of interest. Some film institutions use VHS for access copies to their film collections.

It should be borne in mind that even though VHS tapes often contain copies of materials for which originals elsewhere, the VHS may in practice be the only accessible copy, either because the original is not in a public institution or because access for specific user groups requires a certain level of cataloguing that is only offered by the organization holding the copy. When a tape holds a unique recording, this definitely adds to its value. On the other hand, the reverse is not always true: the fact that a VHS tape is a copy does not necessarily detract from its value for users.

Table 3-11 Video collections per carrier

carrier	no. of responses	unknown quantity	known quantity	amount (hrs x 1000)	% of total amount
VHS	269	41	228	1507	44.0
S-VHS	82	38	44	5.5	0.2
U-matic	111	31	80	38	1.1
Betacam SP	119	27	92	1308	38.2
Betacam Digital	75	30	45	310	9.1
Video8/VideoHi8	56	30	26	6.2	0.2
DV/Digital 8	102	39	63	56	1.6
other	91	16	75	195	5.7
total				3426	100

Note that a substantial number of respondents only give a general size estimate for the whole of their video holdings and do not supply estimates per carrier. Consequently, the totals per carrier do not add up to the total for all video. NB: the 4 respondents with extremely large collections have been excluded here. For calculations, see Appendix A.

Table 3-12 Respondents with carriers in unknown quantities

sector	% of respondents with unknown quantity
research institutes	42
archives	35
museums	27
broadcasters	21
libraries	15

Moreover, although VHS tapes mostly do not contain unique material, there are many exceptions to this rule, such as home videos or documentaries held by archives, field research or documentary material held by research institutes, or VHS held by video art institutions. Broadcasters have pre-production video material with interviews for news items, uncut versions of reports, etc. Compared to VHS, 8mm formats like DV/Digital8 and Video8/Hi8, which are often used for videocam recordings, are more likely to contain unique recordings. Thematic libraries and research institutes list DV/Digital8 recordings of theatre performances, oral history interviews, rituals, ceremonies, etc.

The professional formats U-matic, Betacam SP, and – to a lesser degree – Digital Betacam are widespread in the video collections in the survey. They are predominantly present in broadcast, but also in archival collections. As we have seen archives and broadcasters sometimes have strong bonds. In some countries like for instance Spain, the Russian Federation, Monaco or The Netherlands, local or regional broadcasting companies closely cooperate with archives and local government authorities, which explains why professional video formats sometimes end up in the custody of local or regional archives. One national audiovisual archive reports it holds 36,000 'broadcast log tapes', which are 'not deemed or handled as permanent archives' but receive a special treatment.

The number of video formats is less than that of audio. Apart from the 7 formats we listed in the survey, a third of all video respondents add other formats. Frequently mentioned are: DVD (26), VCR (5) and mini-DV (4). Respondents also added less common formats like; videodiscs, video 2000, 1" and 1/2" open reels, DVCPRO and 'digital files', a category that is bound to grow in the future as the amount of 'digitally born' video is rapidly growing.

Amongst the 'other' formats there are some substantial video collections; a large broadcaster holds 200,000 Panasonic D3 tapes,[60] another broadcaster has 10,000 one-inch tapes, a music theatre institute specifies 2,000 laserdiscs and a governmental organization mentioned 1040 hrs of Video 2000 recordings. It is clear these obsolete formats are a serious preservation risk for the near future.

60 This is an uncompressed digital video tape format, developed by Panasonic in the 1990s.

Table 3-13 Video formats per sector (hrs x 1000)

	archives		libraries		museums		institute		research		broadcaster		commercial companies		private collectors		other		total	
	no.	hrs	no.	hrs	no.	hrs	no.	hrs	no.	hrs	no.	hrs	no.	hrs	no.	hrs	no.	hrs	no.	hrs
VHS	99	226	65	666	34	30	23	57	21	17.2	5	480	4	4.0	6	6.0	10	21.8	267	1507
S-VHS	39	2.26	10	1.1	11	0.5	4	0.4	8	0.3	3	0.3	1	0.2	1	0.4	5	0.2	82	5.5
U-matic	49	15.5	17	12.45	15	1.1	10	5.6	9	1.6	3	0.04	3	0	1	0.1	4	1.7	111	38
Betacam SP	54	25	17	14.2	20	1.0	6	3.2	4	0	7	848	6	401	1	0.1	4	15.3	119	1308
Betacam Digital	35	7.5	8	0.4	10	1.3	3	0.4	4	0	7	195	3	100	1	0.1	4	4.9	75	310
Video8/Hi8	29	2.8	5	87	8	0.2	3	2.1	9	0.9	0	0	0	0	1	0	1	0	56	6.2
DV/Digital 8	40	2.5	19	3.8	15	0.9	6	1.3	10	0.1	4	46	1	0.02	1	0	6	1.4	102	56
other	32	17.9	18	18.8	13	0.6	8	10.9	7	0.4	6	134	1	0.02	0	0	6	12.2	91	195
total		299		717		35		81		21		1703		505		6.7		58		3425

Note that a substantial number of respondents only give a general size estimate for the whole of their video holdings and do not supply estimates per carrier. Consequently, the totals per carrier do not add up to the total for all video. NB: the four respondents with extremely large collections have been excluded here. For calculations, see Appendix A.

Preservation

4

4.1 General

The main aim of the survey was to gain information on the condition of audiovisual materials and the actions that are taken to preserve them. General questions on preservation issues were included as well as more specific questions on the condition of carriers and the problems organizations encounter with their preservation. Questions on digitization were added with a focus on its relevance for preservation. As the role of digitization is not the same for all types of material, here too the questions distinguished between audio, video and film. Digitization will be discussed in more detail in the next chapter.

The first goal of preservation is to extend the useful life of materials for as long as possible, in the face of intrinsic deterioration as well as extrinsic factors affecting their life span. For many audiovisual carriers, particularly tape, chemical degradation limits life expectancy to decades, and this will be even shorter when deterioration is accelerated by suboptimal storage. Film is in principle relatively stable if stored under climatized conditions, but the specific problems with nitrate and acetate film are exacerbated whenever the environment is less ideal. Mechanical carriers by and large suffer less from chemical degradation and when properly stored may survive well into the future, but they are more prone to mechanical damage: shellac disks break easily, whereas vinyl disks suffer mechanical deterioration from replay. For film and tape it is recommended to have separate master and access copies to protect originals from the wear and tear of replay. Hence creation of duplicates is also part of a preservation strategy for audiovisual carriers.

Careful handling, use of duplicates, proper storage in a controlled environment will all contribute to extending the life of original carriers, but they will not be sufficient to provide continued access to information. For most technology-based formats, obsolescence of equipment is ultimately the more pressing problem. Especially for sound and video, that have seen the rise and fall of many different formats during their existence, the disappearance of replay equipment from the market makes it necessary to transfer information periodically to new carriers and formats, in order to keep it accessible. In the audiovisual environment, reformatting is a cornerstone of a preservation strategy aimed at keeping information alive. Nowadays such reformatting will often mean conversion to digital format.

To gain insight in the preservation problems institutions face in management of their audiovisual collections, the questionnaire included general questions on preservation activities as well as questions on condition and problems of the specific media. However, the results do not allow an analysis at the level of each type of carrier, although some respondents volunteer comments that shed more light on this.

4.1.1 Preservation programmes

Of the total of 349 respondents, 233 indicate they do not have a preservation programme for audiovisual collections, whereas 116 state they do (Figure 4-1). Some of those who do not have a programme only manage collections for loan or use (teaching materials), some have very small collections. Others have a general preservation policy for all materials, not one specifically for audiovisual collections. Several respondents comment that they are in the process of making one, or that such a policy is being developed at a national level. One respondent with a medium-size collection states they will not accept any more audiovisual materials until they have a plan for preservation and access. Others say they have plans but no money, so that a functioning programme cannot be set up. One respondent drily remarks 'as long as the government does not give funds no programme is possible' – but does not explain whether there are indeed plans that would induce a government to provide funding.

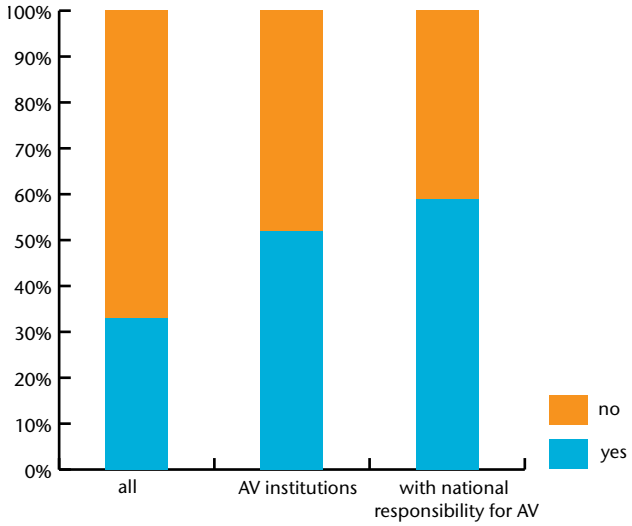
From the comments it appears that 'preservation programme' is a term open to different interpretations. In one organization with a programme, this appears to be limited to monitoring environmental conditions. Some respondents that say they do not have a programme nevertheless state they undertake actions for specific at-risk materials. Apparently they regard these as *ad hoc* interventions, whereas others consider similar activities part of a programme. Many comments relate to climate control and storage; transfer to new carriers (by digitization) is also mentioned frequently: of magnetic tapes and compact cassettes to CD, copying of rare and especially valuable materials, contents from 78s to CD/DVD, VHS tapes to DVD. A few respondents mention the creation of access copies to be kept separately from masters. The comments mostly concern nitrate, acetate materials (vinegar syndrome), U-matic tape, VHS tape or magnetic tape in general.

Of those specializing in audiovisual materials, about half indicate they have a preservation programme. Apart from producers of audiovisual materials, private collectors, and media centres that do not necessarily have a preservation task, this group of audiovisual specialists includes also music and research archives. Of the respondents with national responsibilities, 12 state they do not have a preservation programme, among them several large institutions with national responsibilities for the audiovisual heritage that all have many thousands of hours of material.

4.1.2 Storage and environmental conditions

To extend the life of audiovisual materials, it is essential that they are stored under good conditions. This does not only apply to materials that should be kept in the original format: even if one accepts that originals in due course will be

Figure 4-1 Preservation programmes



Total number of responses 349; 'no': 233, 'yes': 116.

replaced by digital copies – as is the current view for analogue tape – extending the life span of materials is necessary to buy time for transfer to the digital environment. Digitization of audiovisual materials at archival quality is an expensive and time-consuming process, and most organizations lack the resources for large-scale transfer, so it will in any case take decades before this process is completed. Moreover, there are materials – the first among them being film – for which conversion to digital still has limitations which make it hardly an archival strategy; many would maintain that in order for film to be film, it should be kept in its native format. Besides, in an archival view one should always keep the originals if at all possible, so whatever the future developments of digitization and its role for preservation of the audiovisual heritage, proper storage will remain a cornerstone of any preservation strategy.[61]

The recommended conditions are not the same for all materials, which seriously complicates matters for those with small mixed collections. Many respondents indicate that their environmental control concerns general conditions for all materials (most often paper), which means that if they have films (or photographs) these are kept under suboptimal conditions. Specifics about (controlled)

61 See Ray Edmondson, *Audiovisual Archiving: philosophy and principles*, 2nd revised edition, UNESCO, 2004, pp. 45-51, for a discussion of the relationship between content and original carrier, the need for transfer, the possible advantages of delayed transfer, and what he terms 'the inertia effect'. URL: http://portal.unesco.org/ci/en/ev.php-URL_ID=15592&URL_DO=DO_TOPIC&URL_SECTION=201.html

conditions that respondents volunteer mosty refer to temperatures from 18 to 21°C and relative humidity of 40-50%. But some have to deal with fluctuations in temperature of 6 or 7°C, which is more than the recommended range.[62]

There is a clear correlation between presence of environmental control and the size of the collection, as can be seen in Figure 4-2. As one would expect, climate control is also available more often in specialized audiovisual organizations. However, of audiovisual institutions with collection sizes of more than 5,000 hrs, 25% do not keep their materials under climate-controlled conditions. Storage under controlled conditions is more common for those with film collections (9 out of 10 for collections > 500 hrs) than for those with audio and video (around 70% for collections of this size).

4.1.3 Condition of materials

In the question on the condition of materials at the level of specific carriers, groupings corresponded to that in earlier ones on collection size. We could therefore relate assessments of condition with estimates of size at the level of individual carriers, to get an idea of the scale of possible problems.

For film, considerably more respondents answer the question on condition of formats than the question on collection size. For 35mm and 16mm the difference is 25%. This we find somewhat puzzling, as we had expected knowledge on size of collections to be more widespread than knowledge of condition. For audio and video the situation is the reverse, with percentages of condition assessments at 85% and 90% of those for size estimates. For all three media in quite a few cases respondents answer that they do not know what the condition of the format is (overall 21% for film, 16% for audio, 19% for video).

When asked about specific preservation problems, again a significant part of the respondents do not specify anything at all. For instance, almost 40% of film respondents do not say anything about problems with cataloguing, which is the problem mentioned most frequently and considered most urgent overall. One would expect lack of knowledge on the size of the collection to correlate with cataloguing problems; after all, many respondents indicate they cannot give size estimates because of incomplete cataloguing. Yet, of the respondents who cannot give an estimate for the size of their collections, only a minority indicate here that they have problems with cataloguing. As in these questions respondents had the option of explicitly indicating that a specific problem is not present, or the urgency of it unknown, non-response cannot be interpreted as reflecting the absence of problems. We can only note that quite a few respondents do not say anything about these issues.

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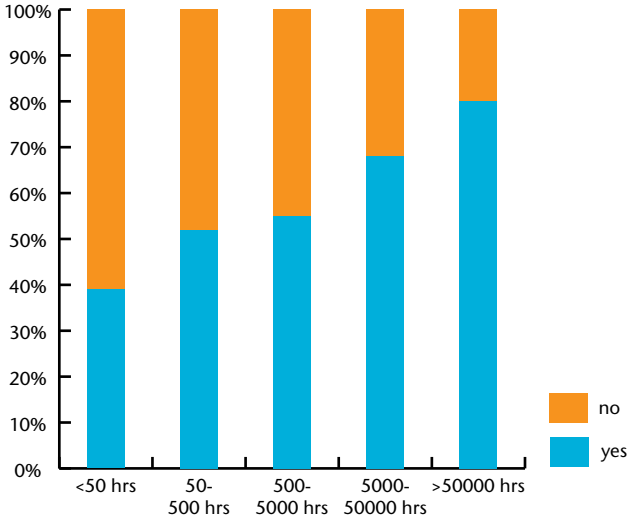
62 For an overview of recommended storage conditions, see Peter Z. Adelstein, *IPI Media Storage Quick Reference,* Image Permanence Institute, 2004, URL: http://www.imagepermanenceinstitute.org/shtml_sub/msqr.pdf. For (ISO) standards for storage and enclosures see the Preservation Portal of the MIC (Moving Image Collections) website, URL: http://mic.loc.gov/preservationists_portal/presv_standrs.htm.

Figure 4-2 Climate control and collection size



Total number of responses 358; 'no': 167, 'yes': 191

4.1.4 Duplicates

Duplicates are made for different reasons. In general it is recommended policy for vulnerable materials that suffer from use to keep several copies: a master, either the original or a newly created preservation master (when the original is at risk of becoming inaccessible through deterioration or obsolescence), which is stored under good conditions for the long term and not accessible to users, and viewing or access copies, which may be on a different carrier for ease of replay.[63] Access copies may be held by the institution, or given to users for consultation in their own environment. Ideally an intermediate high-quality copy exists from which further copies can be made, so that the vulnerable original does not have to be accessed for repeated copying, while the quality of the copies remains constant (for at least with analogue materials, making copies of copies of copies would lead to generational loss).

A complete preservation policy will include also provisions for safety copies, kept at a different location, to limit the risk of loss in case of disaster. In practice, the costs of making extra copies for safety is often prohibitive, so that such measures are reserved for the most valuable materials, but in future electronic files could be copied through a network of institutions who agree to mutually preserve additional copies of their material, if legal matters can be solved. In the

63 For video, see Jim Wheeler, *Videotape Preservation Handbook*, 2002, p.10. URL: http://www.ami-anet.org/resources/guides/WheelerVideo.pdf; *Video Identification and Assessment Guide*, p. 47, URL: http://www.arts.state.tx.us/video/actions.asp#tap.

digital domain such extensive copying to prevent loss of information has become an established preservation strategy.[64]

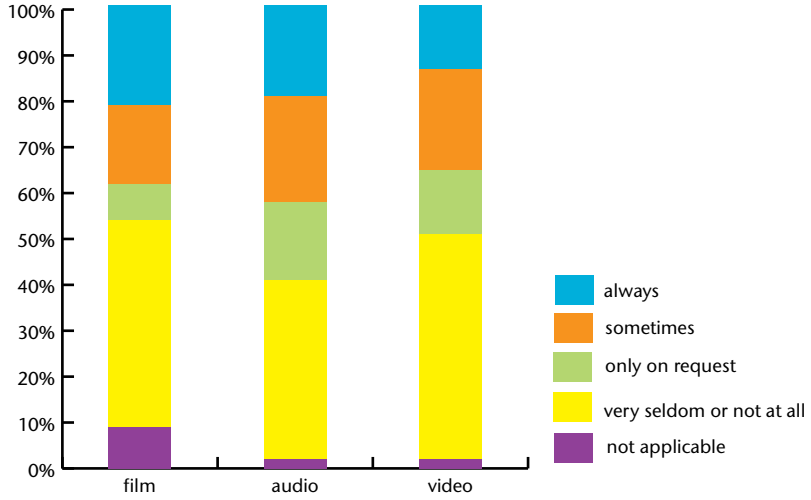
In practice procedures for copying will depend on assessments of the value and condition of materials and the frequency of use. The basic principle for analogue audiovisual materials is that the risk of loss of information, either because of deterioration through use or because of obsolescence of equipment, should be minimized by creating copies. In the digital domain lossless copying and backup procedures have made such procedures common practice, but we were interested to find which policies have been developed for the survival of analogue materials that are not (yet) digitized. The questions were asked not so much to establish which technical choices are made (which will be different for different media) but to what extent procedures for copying are in place. Respondents were asked whether they keep separate master and access copies, and whether they transfer deteriorating materials to new carriers (preservation copies).

From the responses it can be seen that film and audio respondents have a more systematic approach to the creation of separate access copies than video respondents (Figure 4-3). Perhaps part of the explanation is that in a film environment it has always been common to work with viewing copies, and that it is increasingly unlikely that non-specialist organizations have projection equipment available. The artefactual value of the original film, which is widely recognized, may also be a factor stimulating creation of copies in order to keep the valuable original safe. Some film respondents explicitly mention they make access copies on video to provide access to their collections. 'We protect the film material by transferring it on the video cassettes', one large national broadcaster comments. Many film institutions have video copies of their films to limit handling and use of the original film.

Some respondents volunteer comments that show they are uncomfortable about the use of originals as access copies at their institution, so apparently the existing situation is not in all cases what collection managers would like to see. But there are also many respondents for whom there are no strong arguments to create separate master and access/user copies. For one thing, a lot of material mentioned in the survey is commercially produced, or consists of copies to start with – for instance videos that are copies of films. Preservation would then first of all be the responsibility of the (national) institution where the (original) material has been deposited. On the other hand, institutions holding deposit collections would regard preservation of these 'masters' as a primary task, but would not necessarily see it as a first responsibility to facilitate access by creating duplicates. Deposit collections may function only as a 'last resort', a kind of reserve or backup collection for materials kept by other institutions that provide access for the specific user communities that they serve.

64 The LOCKSS initiative is based on this principle. LOCKSS stands for 'Lots of Copies Keep Stuff Safe', see URL: http://www.lockss.org.

Figure 4-3 Separate master and user/access copies



Number of responses: film 181 (total film respondents 219), audio 280 (total audio respondents 326), video 266 (total video respondents 312)

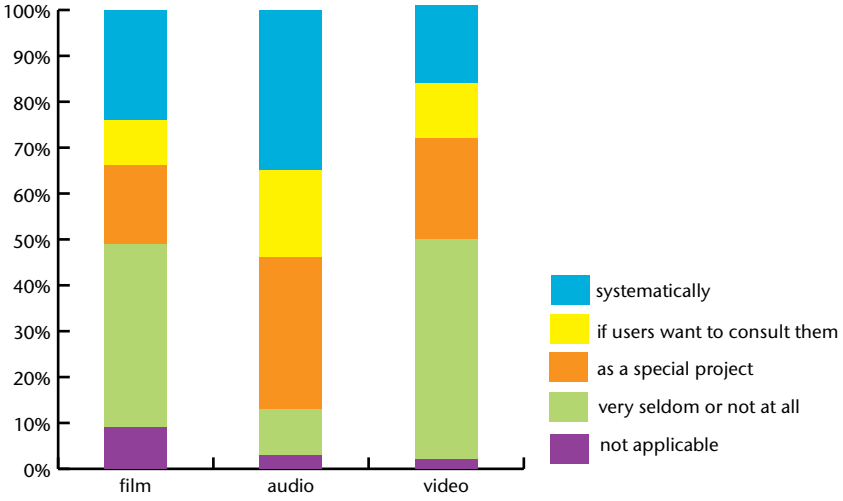
When it comes to transfer of the contents of deteriorating originals to new carriers, about 40% of film and 50% of video respondents state they do this very seldom or not at all. Among audio respondents, this percentage is much lower, around 10%. Transfer to new carriers may be more widespread among audio respondents partly because audio collections are older than video collections and more vulnerable than film, partly because particularly in the digital domain it is easier and cheaper to transfer audio than film or video.

Film respondents most frequently indicate they have a systematic programme for transfer of deteriorating materials to new carriers:[65] 31 respondents, or one-fifth of the overall film population, indicate they have such a programme. In the case of audio the percentage of respondents that is involved in transfer for preservation is relatively high, but it should be taken into account here that nearly half of all audio respondents do not answer the question, so that in relation to the overall audio population (as opposed to only respondents of this particular question) the percentages are very different.

Again, the fact that many respondents are not actively transferring at-risk materials to new carriers can partly be explained from the fact that a considerable amount is not unique and therefore will not be top of the list when it comes to preservation priorities. 'The material is generally not very valuable (…) so

65 It needs to be noted that the term 'systematic' is interpreted in many different ways. Some projects mentioned by the respondents could also be qualified as 'systematic' because of their wide scope. Some 'systematic' programmes could also be called projects because of their limited duration or specific focus.

Figure 4-4 Transfer of content from deteriorating originals



Number of responses: film 174 (total film respondents 219), audio 176 (total audio respondents 326), video 255 (total video respondents 312)

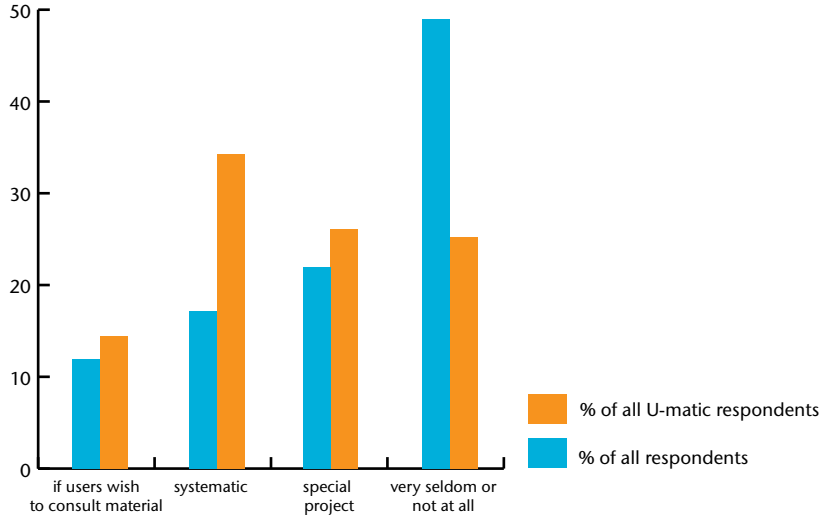
the conversion goes slowly and is quantitatively not very relevant', one regional archive indicates. Also, as will be discussed below, many respondents consider their film, audio and video collections to be in acceptable or (very) good condition. The necessity to duplicate for preservation purposes may not always be considered that urgent. Several respondents comment that their preservation efforts are focused first of all on keeping the originals in good condition; for instance, a national cinématèque writes that their 'main interest is in preserving original negatives in all formats'. Conservation of the original would then be preferred over duplication for preservation (but may involve creation of viewing copies to protect originals from damage through use).

Duplication is done more frequently and more systematically when it is recognized that the original threatens to lock in the content, as is the case for instance with U-matic, an obsolete video format for which playback equipment is not always available. When we compare duplication among all video respondents to duplication among respondents with U-matic, it can be seen that in the latter group a systematic approach is followed more often (Figure 4-5).

Copyright legislation may complicate preservation policies that rely on copying materials to new carriers. A few respondents from France mention that they are forbidden by law to make copies, and the same may apply in other countries, if no provisions have been made to exempt duplication for preservation of heritage from restrictions imposed by copyright.

The comments respondents add on their activities throw a light on how pres-

Figure 4-5 Duplication for preservation among video and U-matic respondents



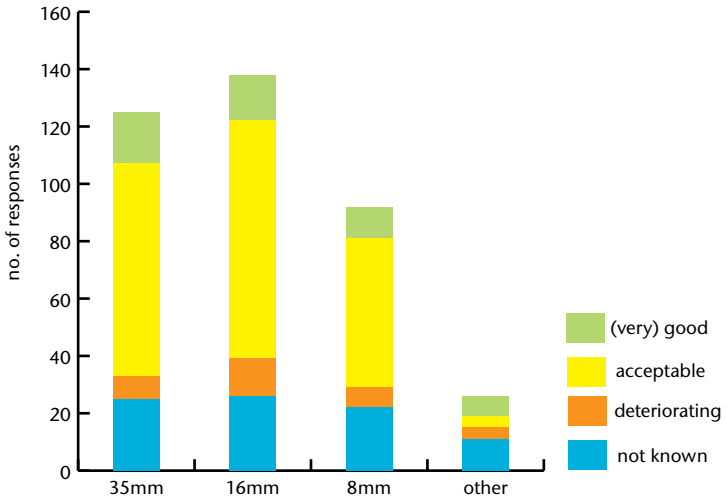
ervation duplication is performed. In case of film institutions, there is mention of transfer of deteriorating nitrate or acetate to more stable polyester film. Some video respondents indicate they are migrating their tapes to Betacam SP. For all three media respondents mention they are involved in transferring their deteriorating analogue materials to digital formats. 'In the early 2000s we made analogue copies when requested, but nowadays we try to avoid it', one audio respondent says. Particularly for audio, transfer from one analogue format to another is rapidly losing ground and To what extent digitization is seen as a preservation measure very much depends on whether it concerns film, audio or video. We will discuss this in more detail in Chapter 5.

4.2 Film

4.2.1 Condition of film collections

More than 20% of the film respondents indicate that they do not know the condition of the specific formats in their collection (Figure 4-6). Some respondents provide explanations for the lack of information. Comments like 'unable to "read" any of the film material in-house as we don't have relevant equipment', 'we cannot exhibit films, because we have not respective apparatus' and 'films have not been viewed for years, so it is difficult to say something about their condition' indicate that low use goes hand in hand with uncertainty about condition. One respondent mentions they have 'no full time person to take care of the audiovisual material,' which points to a lack of skilled personnel as an explanation

Figure 4-6 Condition of film collections



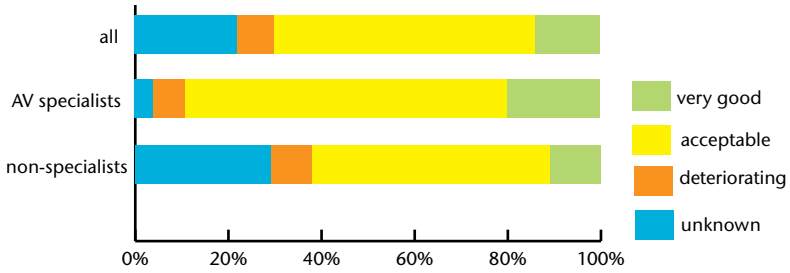
Total of responses for all formats: 381. Total 'not known': 84; (very) good: 52; acceptable: 213; deteriorating: 32.

for lack of knowledge. We came across a Catch-22 situation with a respondent marking 'unknown' under 'general condition' and adding that the collection 'was not yet assessed thoroughly, because it was in a very bad condition.'

Whereas in over 20% of the responses the condition is 'unknown', in 70% of the cases it is considered 'acceptable' or '(very) good'. The 8% of cases in which respondents indicate material is deteriorating relates to 4% of the total amounts quantified. Of all common film formats, 16mm is most often considered to be in bad condition. As it concerns overall assessments of the 'general condition' of each format, the percentages are only a rough indication of material at risk. Also in collections generally in good condition some decaying material may be present, and vice versa. With this proviso in mind, when we relate the assessments to individual collection sizes of respondents, the label 'deteriorating' refers to a total amount of 30,000 hrs.

The percentage of film in good or acceptable condition is highest for 35mm and 16mm (Figure 4-6). A comparison of evaluations by sector does not reveal any remarkable differences. Museums have the lowest percentage of positive assessments and the highest percentages for 'unknown condition' or 'deteriorating' but the differences are not very significant. Among specialized audiovisual institutions and among respondents with staff that is professionally trained for

Figure 4-7 Film condition in specialized and non-specialized institutions



Some respondents specify small collections of less common film formats that are deteriorating: 9mm, 9.5mm and Pathé baby.

management of audiovisual collections, 'unknown' responses make up a much smaller share of the total (not surprisingly). This does not affect the percentage of 'deteriorating' responses, which remains 7-8% in all cases (Figure 4-7). Whether the larger share of collections in good and acceptable condition should be ascribed to more expertise to make assessments or to more possibilities to prevent deterioration (for instance because of better storage facilities) remains unclear. For instance, we did not find a correlation between assessments of condition and the presence of environmental control.

4.2.2 Film-related problems

When asked about specific preservation problems, a significant part of the 219 film respondents do not specify anything at all. Although cataloguing is the problem mentioned most often and considered most urgent, of the 67 respondents with an unknown quantity of film, only 25% mention they have problems with cataloguing. Although their response rate is slightly above average, even specialist audiovisual institutions with film have trouble indicating specific preservation issues; for instance, of the 55 film respondents in this group, 36 (65%) say something about the urgency of the cataloguing issue for their collections.

Preservation issues like cataloguing and storage, that require only an overall knowledge of the state of the collection, have – no surprise – the lowest percentage of respondents that 'do not know'. Problems like mechanical damage and fading can only be tracked down if one has knowledge of individual items in the collection. The number of respondents that indicate they do not know if they have these problems is therefore higher.

Nitrate and vinegar syndrome

Nitrate: cellulose nitrate was introduced by George Eastman as a base for photographic film rolls in 1889. At the time it was the only available transparent plastic that was durable enough to withstand the stress from cameras and projectors. Until the 1950s the highly flammable nitrate film was the regular base for most 35mm film material. Under specific conditions nitrate film can ignite spontaneously, burn very rapidly and release toxic fumes. Because of the security risks of holding nitrate and its often rapid deterioration, it is often recommended to copy nitrate films onto polyester-based film that can last from 100 to 500 years. [66]

Vinegar syndrome: in the 1950s cellulose acetate replaced nitrate as the predominant format for 35mm motion-picture movies. Acetate film (also called 'safety' film) was meant to be an improved, more stable nonflammable successor of nitrate film, but in the 1980s it became evident that, if exposed to moisture, high humidity and heat, acetate film – too – could decay very fast. In the degradation process of acetate film acetic acid is produced, the key ingredient of vinegar with its particular smell, so the problem soon came to be known as the 'vinegar syndrome'.

The acid attacks the base and accelerates image colour dye fading.[67] The rate of the acetate decomposition is primarily determined by heat and moisture, so the storage environment plays a decisive role in preventing or at least slowing down the process of decay. There is some uncertainty amongst experts about the contagious effect of deteriorating acetate film; according to IPI there is limited evidence for separating degrading acetate from the rest of the film collections.[68]

When the selfdestructive process of the 'vinegar syndrome' became apparent, there was also a shift in the evaluation of nitrate. If stored and managed properly, nitrate may survive for 100 years, and sometimes nitrate materials were in better condition than 20- or 30-year old acetate-based film.

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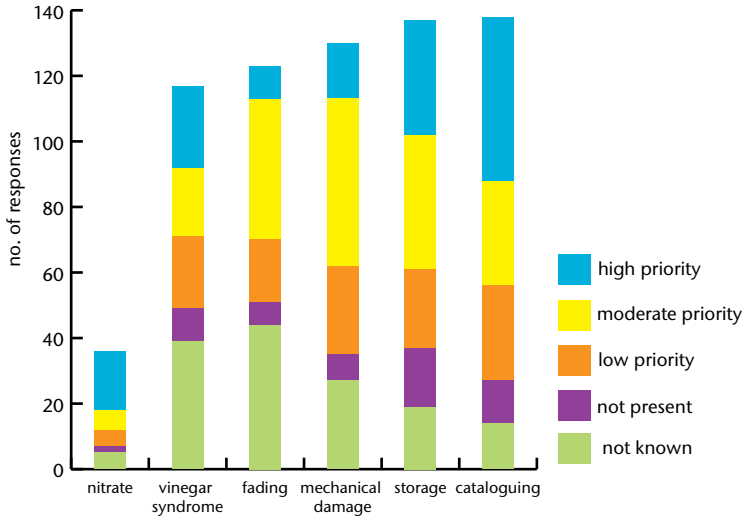
66 National Film Preservation Foundation, *Film Preservation Guide. The basics for archives, libraries and museums*, 2004, p. 8. URL: http://www.filmpreservation.org/preservation/film_guide.html. According to Kodak, safety film will last 500 years for polyester base and 100 years for acetate. See Kodak Cinema & Television, Support, 'Storage room', URL: http://www.kodak.com/US/en/motion/support/technical/storage_room.jhtml?id=0.1.4.15.12.10&lc=en.

67 *Film Preservation Guide*, p.14; James M. Reilly, *IPI Storage Guide for Acetate Film*, Image Permanence Institute, 1993. URL: http://www.imagepermanenceinstitute.org/shtml_sub/acetguid.pdf; Les Paul Robley, 'Attack of the vinegar syndrome. An in-depth examination of the insidious virus that is eating away at America's cinematic heritage', 1996, URL: http://www.capital.net/com/jaytp/VINEGAR.HTM. The National Library of Australia set up a national programme for preserving cellulose acetate collections, ANICA, and published assessment guidelines: URL: http://www.nla.gov.au/anica/assessguide.html.

68 *IPI Media Storage Quick Reference* recognizes that in practice it is not always 'practical or desirable' to separate degraded acetate or early-stage deteriorated nitrate from the rest of the collection, and adds 'The rate of decay of "good" film depends much more heavily on temperature than it does on the amount of acid vapor the film may have absorbed from "bad" neighbors. In addition, adequate ventilation and fresh air exchange can greatly mitigate the threat of contamination.' URL: http://www.imagepermanenceinstitute.org/shtml_sub/msqr.pdf. See also *IPI Storage Guide*, p.14.

Figure 4-8 Problems with film collections



About a third of all 138 respondents to this question qualify cataloguing as a 'high priority' problem, which is more than the number for storage (Figure 4-8). Comments refer to lack of time to solve backlogs ('large cataloguing backlog but demands of running public searchroom limits staff time for background jobs') or inadequate cataloguing ('our cataloguing is too basal'). Cataloguing is discussed in more detail in Chapter 6 on 'Access and use'.

Inadequate storage contributes to the incidence of preservation problems like 'vinegar syndrome' and nitrate deterioration.[69] It is therefore not surprising that a large number of respondents express concern about storage and that 25% of them find it needs urgent attention. Respondents comment not so much on lack of space, but more on the lack of proper environmental, climate-controlled conditions. The conditions under which film should be stored are different from those for audio, video, or other materials. Ideally, it is kept separately from other materials, under constant temperature and humidity levels at a maximum of 10°C and 50% RH.[70] Only dedicated audiovisual institutions can afford such facilities, which can be very costly and require regular monitoring. For nitrate, storage facilities should meet strict requirements for security and safety: some institutions store their nitrate in remote, shockproof 'bunkers'.[71]

69 *IPI Storage Guide,* p.10.

70 'Ideally', but it is recognized that is is not always practically possible. This standard is maintained for instance at the Library of Congress. See 'Care, handling and storage of motion picture film', 1998, URL: http://www.loc.gov/preserv/care/film.html.

71 See for instance the story about the National Audiovisual Conservation Center of the Library of Congress: Katie Dean, 'Bunker holds a mountain of movies', *Wired*, May 2004, URL: http://www.wired.com/news/digiwood/0,1412,63311,00.html.

Of all film respondents, 75% keep their film collections on their own premises. Of this group, 40% do not have climate-controlled storage facilities, 60% do not employ trained staff for audiovisual materials, and an almost similar share lack a preservation programme for their audiovisual collections. So, despite the fact that many institutions keep their film collections themselves, conditions to do so are far from ideal.

In our survey population, film usually forms only a small part of a larger multiple media collection. This can turn out to be a real disadvantage for the film holdings, which contrary to recommendations are in practice often stored in the same room with other materials, especially when the institution primarily holds paper collections. A Dutch regional archive with about 750 hours of film, for instance, mentions that at the moment film is stored with their paper materials, at 18˚C and 50% RH, which is considered adequate for their paper and video holdings but not for film. They plan to move their film collections to a specialized institution.

Other respondents also acknowledge that climate conditions are insufficient for film, but are limited by practical circumstances. The information provided by respondents that store their film under climate-controlled conditions shows a variety of settings for temperature and relative humidity.[72]

Some respondents say they are considering storing their film with third-party specialists. Respondents with nitrate indicate that for safety reasons they have handed over their nitrate to specialized institutions, usually national or regional audiovisual institutions.[73] Usually their services are not limited to storage facilities, but also include conservation work on the material, production of access copies (on video or digital) or transfer of nitrate/triacetate to polyester film, for institutions that place material in their custody. Often they have developed into expert centres for film preservation, from a responsibility towards the national cultural film heritage.

Compared to audio and video, institutions with film are generally more inclined to place (part of their) collections in the care of others. One out of four film respondents outsource storage to other (specialized) organizations (for audio/video this is one out of five). The reasons given for this decision are: security (nitrate), better environmental conditions, and more expertise on film conservation. One regional archive that placed their film in the care of a regional film

72 For recommendations on storing acetate film: *IPI Storage Guide*; National Library of Australia, *Storage of Cellulose Acetate Collections. A preliminary survey of issues and options*, 2002, URL: http://www.nla.gov.au/anica/storagecontents.html.

73 Some of the national AV-centres mentioned by respondents: **the Finnish Film Archive, the British** Film Institute (UK), East Anglian Film Archive (UK), Filmmuseum (Netherlands), Österreichischen Filmarchiv (Austria), Filmoteca Espanola (Spain), Bundesarchiv (Germany), Slovene Film Archives (Slovenia), National Library of Norway (Norway), Koninklijk Belgisch Filmarchief (Belgium) and the Centre national de la cinématographie (France).

archive would have liked to see a regional repository also assume responsibility for storage of their audio collections but 'there isn't one for our region'.

Closely related to the storage problem is the issue of nitrate-based film, which predominantly concerns 35mm film older than 50 years. In the survey there are 98 respondents with 35mm, 40 of which state they have nitrate; their estimates amount to some 2.5% of all quantified film in the survey. Of this group, 29 recognize nitrate as a problem, and for about half of them it has high priority. If kept under proper environmental conditions, with adequate climate control, some nitrate has proven to remain quite stable over time.[74] Of the 40 respondents with nitrate, 14 have placed it in the custody of another (specialized) organization. Of the remaining 26 respondents that keep it themselves, 5 do not have climate controlled storage facilities.

Although inevitably acetate-based film will be present in many of the collections in the survey, only 74 respondents provide information on vinegar syndrome. There are 17 respondents that indicate they do not know whether their collections are affected or not. 'As a non-expert the term 'Vinegar Syndrome' does not mean anything to me', one respondent says. The lack of knowledge on the presence of acetate deterioration corresponds with the outcome of the NLA acetate survey in Australia held in January 2000.[75]

For 25 of the 219 film respondents acetate deterioration is an urgent problem (Figure 4-8). The majority (15) are audiovisual institutions, maybe because these on the whole have more expertise to recognize the symptoms of acetate deterioration (vinegar odour, embrittlement, shrinkage).[76] Most of these 25 respondents indicate they have climatized storage, but they specify a wide variety of settings for temperature and RH.

About 60% of all film respondents say something about mechanical damage, and although many perceive it as a problem, only 17 respondents consider it to be a top priority issue. Unfortunately none of the respondents volunteer information on the mechanical problems they encounter. Compared to audio and – to a lesser degree – video respondents, film respondents appear to be less concerned about mechanical damage.

A small number of film respondents (10) consider fading to be an urgent preservation issue, but a third of the 123 respondents that say anything about fading

74 See for instance: *This Film is Dangerous – A Celebration of Nitrate Film,* edited by Roger Smither and Catherine A. Surowiec (FIAF 2002). Ray Edmondson, *Audiovisual Archiving* argues that the 'nitrate won't wait'-slogan needs to be adjusted, because under proper storage conditions nitrate can last longer than for instance inferior triacetate copies from 20 or 30 years old (p.46).

75 In the survey of the National Library of Australia, in the framework of the national strategy for dealing with deteriorating cellulose acetate collections, of 29 institutions only half had surveyed their collections, which led to the conclusion that 'the extent of deterioration of cellulose acetate materials nationally is poorly defined'. National Library of Australia, C*ellulose Acetate Project, Stage one, final report*, 2000, p.36. URL: http://www.nla.gov.au/anica/cellulose.pdf.

76 *IPI Storage Guide*, p.11.

indicate that they do not know if their collection is affected by it. Fading can only be discovered by close inspection of films and frequently occurs when environmental conditions are inadequate. One respondent for whom fading is a 'high priority' problem, remarks that 'the temperature is too high for film materials'. Among the 101 respondents with colour materials in their collections (at an average of around 50% of their collections) the issue is mentioned more frequently, which is not surprising considering fading usually occurs with colour film.

Film respondents were not specifically asked if they experience problems with playback equipment, because it was assumed that this was not really an issue with film. Film institutions usually have their own viewing rooms where users can see the original film or – more commonly – a videotape of the film. Many other institutions will probably have the means to provide access to either the original or a video copy. Still, 4 film respondents comment that they do not have any equipment to play their films nor viewing copies in other formats, leaving their (very small) film holdings inaccessible. One respondent remarks that 'unfortunately the master copies are also the access copies'. This will often be the case as well in other institutions that do not have access copies on video or DVD.

4.3 Audio

4.3.1 Condition of audio collections

Among audio respondents, the percentage that offer an evaluation of the condition of a specific carrier (compared to the number who indicate it is present in their collections) ranges from 40% (LPs) to 85% (recordable CDs and DVDs). The overall percentage is 72%.[77] The others do not answer the question or reply the condition is 'unknown'.[78]

The lack of knowledge on the condition of LPs (which is consistent through all categories of respondents) is somewhat puzzling, as one would expect these to be among the most used, given their strong presence in music libraries and media centres. Low use from lack of playback equipment one would sooner expect with older carriers. Underuse through incomplete cataloguing would also seem less likely, as LPS are relatively easy to describe on the basis of sleeves and labels carrying the producers' information – unlike for instance open reel tape. Yet in all comparisons within sectors the percentage of respondents offering information on the condition of LPs is less than half compared to that for answers on open

77 I.e. the total number of replies about presence of carrier related to total number of replies on condition.

78 For an overview of audio carriers, life-expectancy and potential problems e.g.: IASA Task Force to establish selection criteria of analogue and digital audio contents for transfer to data formats for preservation purposes, IASA, 2003, URL: http://www.iasa-web.org/taskforce/taskforce.pdf; Gilles St-Laurent, 'The care and handling of recorded sound materials', National Library of Canada, 1996, URL: http://palimpsest.stanford.edu/byauth/st-laurent/care.html.

reel tape or cassettes. Possibly, because LPs are by definition commercially produced, many institutions regard their preservation as a primary responsibility of the national deposit collection.

One might expect higher response rates among organizations with preservation responsibilities, like archives, museums and national institutions. However, the figures do not support a correlation between insight into condition of collections and a responsibility for cultural heritage. Percentages for the cultural heritage group are very similar to those for the whole population. Archives as a group supply less information on condition than audio respondents in general – 69% of archive respondents who have a carrier can say something about its condition. Data about condition are lacking most clearly in museums, where only 57% of those with a specific carrier provide an assessment of its condition. The regional archive and the theatre museum that volunteer the following comments are obviously not alone:

> Condition is largely unknown as we have no means of accessing them and do not do regular checks. Some magnetic tapes and compact cassettes may have problems but none that I have seen are showing obvious signs of deterioration.

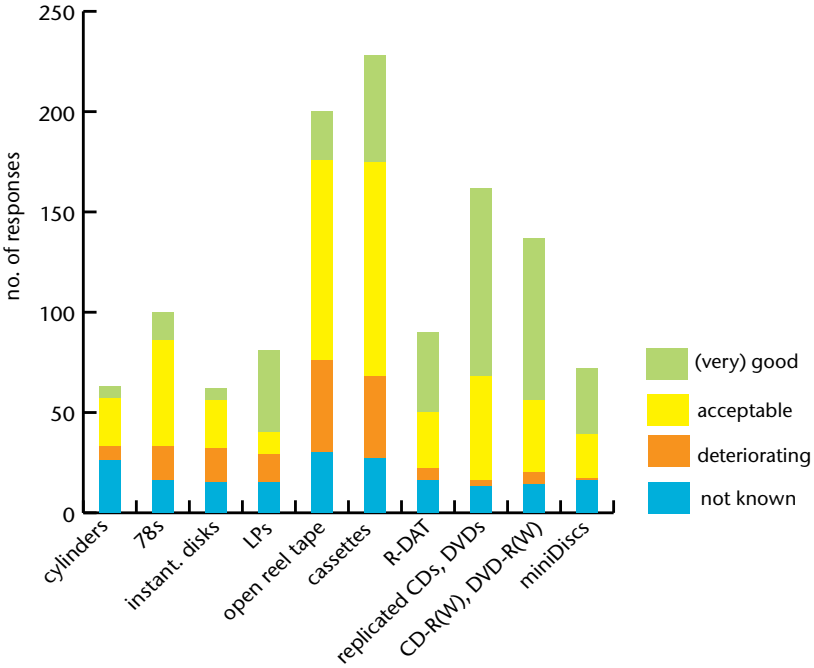
> No information about the condition of most of the material. Possible damages are found only when trying to use the material.

Institutions that specialize in audiovisual materials on the whole have more information available: in this group a total of 82% who have specific carriers also provide information on their condition, and for some carriers (open reel tape, CD-R(W), DVD-R(W), compact cassettes) over 90% of them provide an assessment of condition. Still, it has to be borne in mind that even in this group of specialists about 25% of the respondents do not indicate whether or not they have open reel tape or cassettes, and a third of those who say they have cassettes do not give an estimate for the size of their collections. In other words, even when one narrows the selection down to institutions where there is the most experience and expertise, there are still many pieces missing to make a complete picture.

Of the total number of evaluations of condition by carrier, around 13% is 'deteriorating'. This is similar for specialists and non-specialists, and also for most sectors. An exception are research collections that report deteriorating materials in almost 25% of the cases.

There is a clear correlation between collection size and available information on condition. Smaller collections (<500 hrs) provide fewer answers than larger collections (> 5000 hrs), and moreover in 28% of the cases answer the condition is unknown, whereas the larger ones do so only for 7.5% of responses.

Figure 4-9 Condition of audio carriers



Total of responses for all formats: 1195. Total 'not known': 188; (very) good: 392; acceptable: 457; deteriorating: 158.

It is highly speculative to say anything about the amount of material considered at risk, first because a substantial number of respondents do not know how much they have of specific carriers, second because quite a few do not respond to the question on condition. Moreover, assessments are *overall* evaluations of a format, as several respondents point out: 'Teilbestände sind vom Zerfall bedroht' or 'the quality of C-cassettes, DAT-tapes and Minidiscs varies from good to bad'. But to suggest some order of magnitude, this is what we found.

The amount of material quantified by all respondents (but excluding the four extremely large collections) is around 4.4 million hours. When we relate individual assessments of condition to the individual estimates for each format given by respondents, the evaluations relate to more than 3.8 million hours, and the label 'deteriorating' is applied to 366,000 hrs (9.5%). More than 300,000 hrs of this material consists of open reel tape and compact cassettes, and a third of this is found in archives. Broadcasters have many times more open reel tape, but only 2 of them evaluate their tape as 'deteriorating'; the majority indicate it is in 'acceptable' condition (possibly because their professional recordings were of better quality to start with, possibly also because in the past decades they already transferred content from deteriorating or obsolete tape to new formats). The most

Magnetic tape

Magnetic tape is the most widespread carrier in audiovisual archives. It comes as open reel tape used for sound recordings, as compact cassettes, videotapes, tapes from dictation machines and from camcorders, in many professional, semi-professional and consumer formats. The recordings themselves can be analogue or, for recent formats, digital sound or moving image (not exclusively: data tape used in IT is also a type of magnetic tape) but the tape itself is always built on the same principle. It is constructed of a base film with a layer of a binder containing magnetic particles.

Up till the mid-1960s acetate cellulose was widely used for the base; at the end of the 1950s a polyester base was introduced. Tapes produced in Germany between the early 1940s and the early 1970 usually have a PVC base. Both PVC and polyester are stable materials, but acetate cellulose may shrink and become brittle through chemical decomposition under the influence of water (hydrolysis). Moreover, hydrolysis produces acetic acid which acts as a catalyst speeding up the degradation process. Acetate tape is particularly at risk when kept at high humidity and temperatures.

Acetate cellulose was also used in earlier tapes for the binder layer, and acetate binders may degrade in similar ways. PVC binder, used in the 1950s and 1960s, does not show this problem, but the polyester polyurethane binder used since the 1970s is also susceptible to hydrolysis. The binder absorbs moisture (from the air) and becomes 'sticky', clogging the tape heads when played and shedding particles from the magnetic layer. This 'sticky shed syndrome' occurs with some types of audio and video tapes produced in the last decades of the 20th century. Often the information on these tapes can still be rescued by treating the tape for a single replay so that the contents contents can be copied, but the deterioration of the binder may also be so far advanced that the information is lost.

Degradation of the tapes themselves varies with type, brand and age, and is accelerated by high humidity and temperatures. Fluctuating temperatures and humidity result in expansion and contraction of the tape pack leading to distortion of the polyester back. Distortion can also be caused by poor winding of tape. In replay, careful handling, clean environment, and expert use of well-adjusted, modern equipment –which usually places less stress on the tape than older machines are essential to avoid damage and obtain an optimal sound quality. [79]

79 On magnetic tape, composition, risks, handling: John W.C. Van Bogart, *Magnetic Tape Storage and Handling: a guide for libraries and archives*, Commission on Preservation and Access, 1995, URL; http://www.clir.org/pubs/abstract/pub54.html; IASA Task Force to establish selection criteria of analogue and digital audio contents for transfer to data formats for preservation purposes, IASA, 2003, URL: http://www.iasa-web.org/taskforce/taskforce.pdf; IASA Technical Committee, *Guidelines on the Production and Preservation of Digital Audio Objects*, edited by Kevin Bradley, TC-04, IASA, 2004.

striking finding is the high percentage of deteriorating materials in research institutes: 8 out of 22 report their open reel tape is deteriorating (which relates to 44,000 hrs, or 50% of their quantified tape collections) whereas 7 out of 20 have deteriorating compact cassettes (7,000 hrs, or 30% of their cassettes). In libraries, the main problem is compact cassettes, with 74,000 hrs (10.8%) suffering from degradation.

The comments offered by respondents also mostly relate to magnetic tape. A national archive remarks: 'The most part of the collection is on magnetic tape and is deteriorating'. Another respondent comments: 'Some part of the open reel tapes could not be played without cleaning the tape heads at least 3 times', while a third respondent says they do not know the condition of most audio tapes, but do know some of them suffer from vinegar syndrome. Vinegar syndrome is in fact specifically mentioned several times.

Apart from problems with the types of carriers listed in the questionnaire, respondents mentioned some other specific carriers they hold, like wire, VHS with sound material, microcassettes and 'magnetic sound'. Except for wire, the condition of these materials also causes them concern.

4.3.2 Problems with audio collections

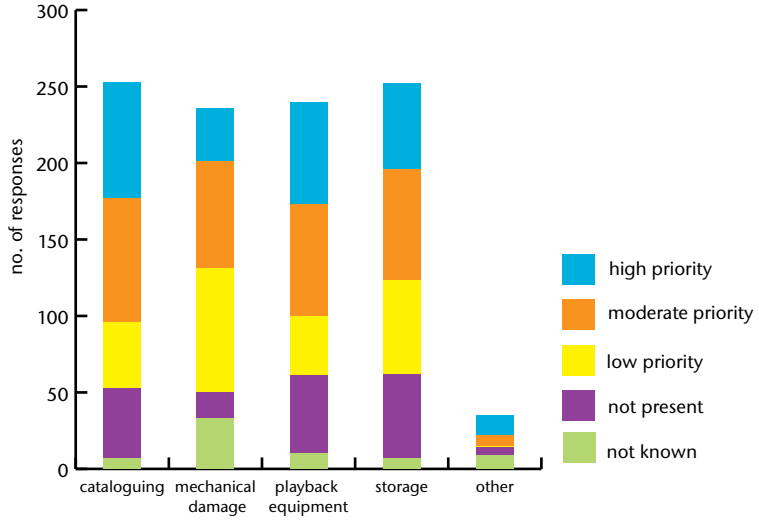
For the questions on (preservation) problems with management of audio collections and the severity of these problems, around 80% of respondents provide answers. Here too the amount of information offered shows a correlation with collection size. Whereas the response rate for small collections (500 hrs) is below 70%, for large collections (> 5000 hrs) it is over 90%.

The urgency of issues that respondents indicate also changes with size of the collections, in ways one could perhaps predict. Overall, cataloguing is the problem most often mentioned as a high or moderate priority issue. However, for respondents from small collections lack of playback equipment is an even more urgent problem: for approximately 40% of them this has high priority, against less than 20% for large collections (where, moreover, in 25% of the cases respondents state explicitly that there are *no* problems with equipment, against 16% for small collections). Storage is also a more pressing problem for small collections than for large ones, which in 30% of the cases report they have no storage problems.

An opposite trend can be seen for mechanical damage (16% high priority in large collections, 6% in small ones). Respondents from small collections have less information on the presence of this specific problem: in almost 30% of the cases they indicate that they do not know whether it is present or how urgent it is.

These results are obviously to some extent related. By and large, when there is no playback equipment, the materials cannot be used and if they are not used, mechanical damage will not easily be noticed. For instance, IASA recommends

Figure 4-10 Problems in audio collections



to carefully spool through tape in order to assess its condition as 'tape rarely shows visible signs of decay or damage.[80] When one considers the number of respondents that report problems with cataloguing and with playback equipment, one cannot help but conclude that a substantial amount of materials are not accessible, which also goes some way to explain uncertainties about the general condition of collections.

Most comments from respondents relate to storage, to equipment and obsolescence of carriers, and to concerns about degradation of carriers. Problems with storage may also have to do with lack of space, but the comments all concern climate control. Several respondents state their primary strategy for keeping the collection in good condition is by optimizing storage, and a number of them indicate they need better storage or climate control. Some report mould, specifically with cylinders.

Several respondents mention they have no equipment for wax cylinders, and equipment for DAT and 78s is also lacking. A music archive comments they have no equipment for 78s and open reel tape (while they have hundreds of hours of materials on these carriers). A Russian respondent adds it is not so much the degradation of old carriers that causes problems but more and more the impossibility of playing them. A Finnish institution says they have no problem with

80 IASA Technical Committee, *Guidelines on the Production and Preservation of Digital Audio Objects*, edited by Kevin Bradley, IASA TC-04, 2004, p. 23. Steps for an initial evaluation of overall condition are listed in 'Basic inspection techniques to sample the condition of magnetic tape', Specs Bros, 2002, URL: http://www.specsbros.com/whitepaper.html.

long-term preservation and cataloguing of digitized material but with the analogue material.

Obsolescence of carriers for which there is no playback equipment and the need to transfer material to digital format are related issues most often mentioned when respondents volunteer comments on other problems they encounter. The catch here is, clearly, that playback equipment is needed in order to realize this transfer, as well as expertise to operate the equipment. Moreover, in order to have well-functioning equipment, regular maintenance is recommended, which is why we asked whether arrangements have been made for this. Around 50% of respondents answer the question with yes, which may seem very low, but here it should be taken into account that quite a number added comments to the effect that they do not have any equipment to maintain. Others say there is no schedule and maintenance is done only in case of malfunctioning, or by volunteers. It is also pointed out that it is hard to find specialists for this work. Problems with technical infrastructure and support generally appear from comments like 'we have no constant maintenance (at the moment it does not function)' and 'we are not sure it all works'.

One of the largest audiovisual institutions comments that regular maintenance is so demanding that even they are forced to prioritize. Some broadcasters and national institutions particularly from Central and Eastern Europe report they have specialists who deal with this. A radio broadcaster from Poland underlines that for faithful reproduction of sound from older carriers one cannot rely on historical or modern equipment available in the market but needs to build equipment oneself.

In short, requirements in terms of equipment and expertise are such that many institutions are struggling with this. Transfer to the digital domain is often seen as the solution, but given the inadequate technical infrastructure many respondents are faced with, they would have to find ways of outsourcing this transfer. In this perspective, those are correct who comment that in the end the problems are not technical but that the necessary work cannot be done for lack of resources.

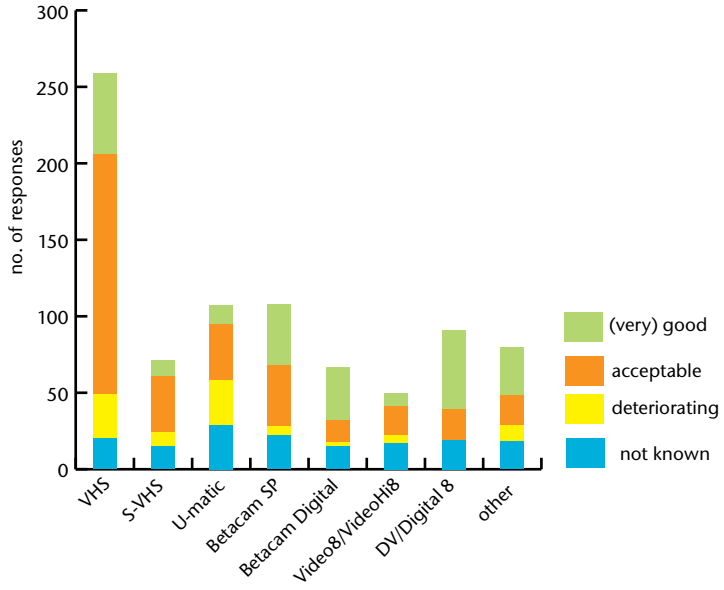
4.4 Video

4.4.1 Condition of video collections

In discussing the condition of video carriers, one should bear in mind that video was not originally produced as an archival format but invented for 'time-shifting' programmes. One of the instigators of early video was Bing Crosby, who invested large sums of money to improve video technology so that his shows could be pre-recorded instead of broadcast live.[81] In 1997 a Library of Congress report

81 Crosby had also been an early adapter of tape recording, using it for his radio shows, for the same reason. Steve Schoenherr, 'Der Bingle Technology', 2002, URL: http://history.sandiego.edu/GEN/recording/derbingle.html.

Figure 4-11 Condition of video collections



Total of responses for all formats: 833. Total 'not known': 155; (very) good: 243; acceptable: 343; deteriorating: 92.

on American television and video preservation calls video next to nitrocellulose film 'probably the next best medium for a society which did not wish to be reminded of its past.'[82]

The life expectancy of video does not only depend on the format but also on the brand, storage conditions, the number of recordings, tape handling and playback conditions.[83] Experts estimate the life expectancy of magnetic tape to be 30 years at most,[84] but with the rapid format shifts, the greatest risk for video collections lies in the loss of the playback equipment.

The number of respondents that answer the questions on condition is about 90% of that for responses on video formats and size of collections. An average of 19% indicate they do not know the condition of a specific format, which is in between film (25%) and audio (16%).

82 Library of Congress, *Television and Video Preservation 1997. A report on the current state of American television and video preservation*, Vol. 1, 1997, Chapter 2.B.1, URL: http://www.loc.gov/film/tvstudy.html.

83 *Videotape Identification and Assessment Guide*, p.37.

84 Van Bogart, *Magnetic Tape Storage*, mentions 30 years as the maximum given by manufacturers, but adds longevity may vary and that useful life of tape depends on availability of equipment (pp.11-12). Most experts speak of a longevity of several decades.

The overall percentage of responses that state a video format is in (very) good or acceptable condition is around 70% (Figure 4-11). A little more than 10% responses concern material that is 'deteriorating', which relates to a total of 600,000 hrs of video quantified for these carriers by the respondents concerned, or almost 7% of the total amount quantified in the survey. A large share of this is VHS, which 11% of respondents consider to be at risk. S-VHS and specifically U-matic give more cause for concern, as do some less current formats mentioned by respondents but not in the select list of formats.

These results are similar to the conclusions of the UNESCO *Survey on Endangered Audiovisual Carriers* from 2003.[85] The 68 respondents in that survey that had VHS estimated 70% of their VHS-cassettes to be in good condition, whereas the 9 institutions with Betacam SP considered over 96% of their holdings to be in good condition. Of the 41 UNESCO respondents with U-matic 21% mentioned 'good condition', 42% 'giving some concern' and 36% 'obviously decaying'.[86]

U-matic is known to be a vulnerable video format. For instance, reports from the BBC Archive show that 30% of their oldest U-matic tapes –from the early 1980s and around 20 years old – had read failures, caused by the decay of the adhesive.[87] The concern expressed by the UNESCO respondents in 2003 is shared by the TAPE respondents: about 27% of all respondents with U-matic say it is 'deteriorating'. Moreover, the same percentage indicate they do not know the condition of their U-matic tapes. U-matic, now obsolete, can be found in many institutions all over Europe and it poses serious preservation problems for the near future.

Less widespread, but also considered to be at risk, is S-VHS: 13% of 71 respondents indicate that their S-VHS tapes are deteriorating. Under the heading 'other' respondents commented on the condition of less common formats. Not everyone adds details, but a number of respondents report deterioration of such formats as 1" 2" and 1/2" open reel tapes, MII, VCR 1, Panasonic D3, old Betacam ('Betacam oxido') and q-SECAM.[88]

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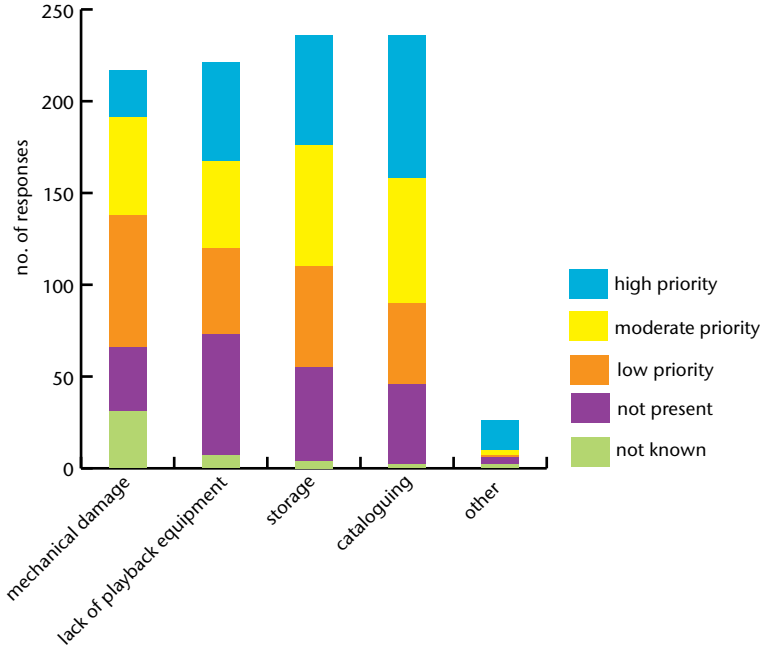
85 George Boston (IASA), *Survey of Endangered Audiovisual Carriers*, UNESCO, 2003, p. 6. URL: http://portal.unesco.org/ci/en/ev.php-URL_ID=13437&URL_DO=DO_TOPIC&URL_SECTION=201.html

86 Boston, *Survey,* pp.6-7.

87 Richard Wright, 'Audiovisual mega-preservation. Status and prospects of the audiovisual heritage', paper presented at JISC CNI Fifth International Conference, Brighton 8-9 July 2004, URL: http://www.ukoln.ac.uk/events/jisc-cni-2004/presentations/r-wright.ppt.

88 For a brief overview of video formats, identification and risks (obsolescence, vulnerability) see the guidelines by Memoriav, available in French, German and Italian. URL: http://fr.memoriav.ch/av/recommendation/recommendations.aspx.

Figure 4-12 Problems in video collections



4.4.2 Video-related problems

Just like audio and film the video respondents qualify storage and cataloguing as their most urgent issues. A considerable number of respondents are worried about the lack of playback equipment and mechanical damage (Figure 4-12). These problems sometimes reinforce each other; some respondents indicate that they cannot catalogue properly because they do not have the right playback equipment to view their tapes.

Like cataloguing, storage is not a problem specific to video collections but to audiovisual collections in general. Among video respondents too the problem is not so much lack of space but (lack of) proper climate-controlled conditions. Some video respondents specifically state their materials should be moved to storage better suited for audiovisual carriers, but insufficient funds prevents them from doing so. Half of the 80% of all video respondents that keep their audiovisual collections in their own institutions, do not have climate control; some libraries and small archives mention the videotapes are stored with books and other paper documents.

Lack of playback equipment is an urgent problem for about one-sixth of all video respondents (Figure 4-12). 'It is hard to find a well-functioning Umatic player (it breaks down frequently)', a small museum reports. Other respondents

mention trouble with playback of Betacam SP, MiniDV, one-inch tape and Sony open reel tapes. Both small and large video collections (with a wider variety of different formats) often suffer from a lack of adequate playback equipment.

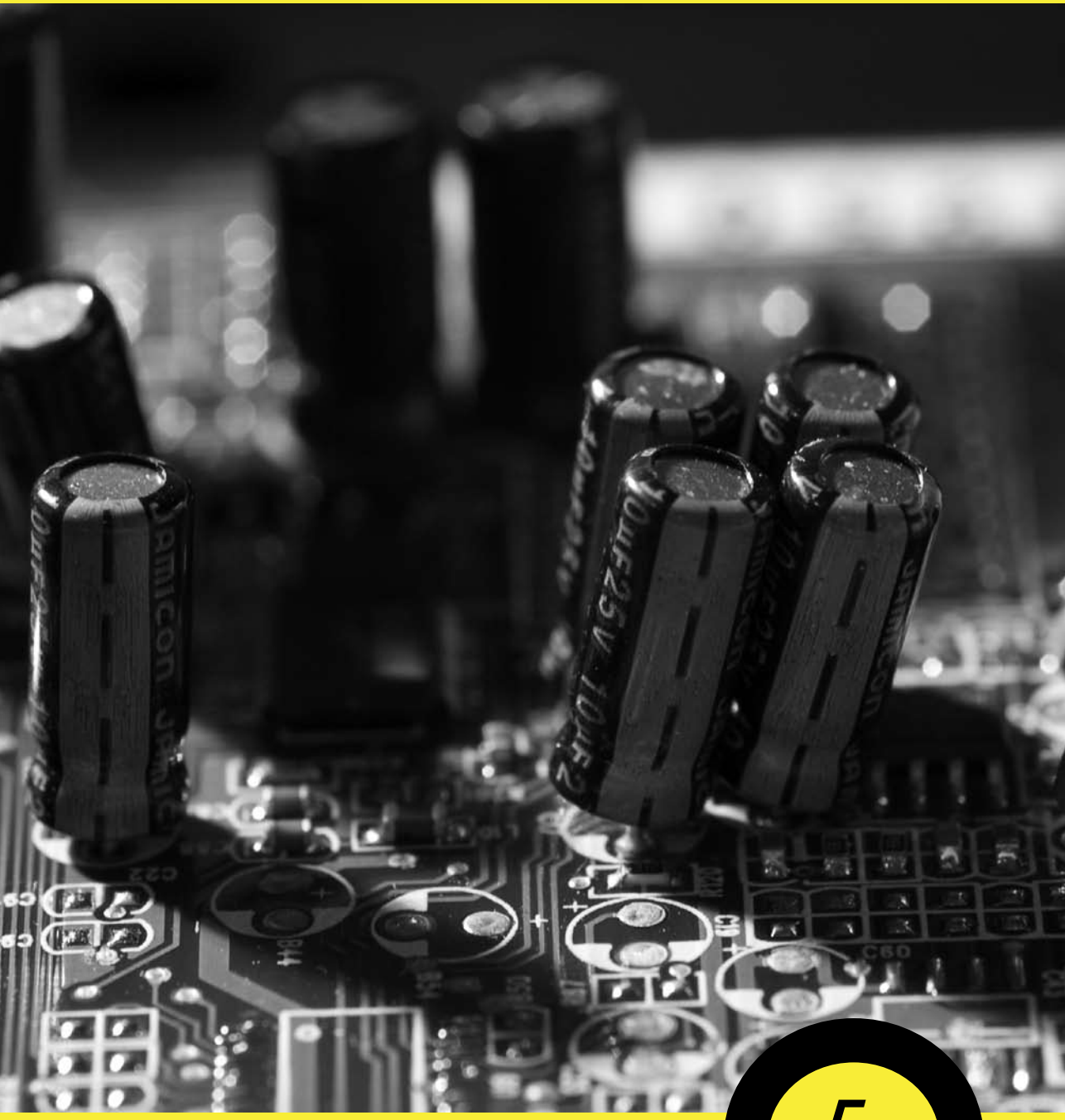
Service checks to ensure that equipment is in good condition are not always performed regularly, and the smaller the video collection the less likely it is that there is a schedule for maintenance. Playback of videotapes on inferior or badly maintained equipment can cause mechanical damage. Tapes can get stretched, edges can be damaged, etc., causing signal loss and playback errors.[89] Although 151 video respondents mention mechanical damage as a problem, for only 26 of them it is problem that has a high priority. Respondents do not go into details on the damage they encounter, with the exception of one folk music institute that indicates that especially their 'old recordings' are affected by mechanical damage.

Among the comments respondents volunteered on other preservation-related issues there are a couple mentioning signal fading. The signal is represented on a tape by the arrangement of magnetic particles in a specific pattern. Deterioration of the carrier or the layer binding the iron oxide particles to the carrier may lead to signal fading.[90] When stored under unfavourable conditions, degradation of the base or binder can be accelerated further and result in 'sticky shed syndrome' (see above, p.77), which is known to be one of the most common deterioration processes for video. From remarks made by respondents, combined with the fact that many of them do not keep their collections under climate-controlled conditions, it can be inferred that some of the video collections in the survey are affected by the 'sticky shed syndrome'.

Other issues explicitly raised by video respondents include: manpower and training, improvement of access to the video collection by for instance producing user copies, digitization and duplication.

89 *Videotape Identification and Assessment Guide*, p.38.
90 *Videotape Identification and Assessment Guide*, p.37-38.

Digitization



5

5.1 Introduction

Digitization opens up new horizons for management of audiovisual collections in more ways than one. The difference that conversion to digital format makes for accessibility of audiovisual materials is even more pronounced than in the case of printed documents or photographs. For technology-based materials like film, video and sound, the dependency on different types of playback equipment complicates access to such a degree that in many non-specialized institutions (part of) the audiovisual holdings in practice cannot be consulted for lack of the necessary machines. Once materials are in the digital domain and this specific barrier is removed, the possibilities for consultation are substantially increased, also because digital access opens a range of new ways to interact with audiovisual resources which are not possible in the analogue world. These are real advantages for on-site use, but if web access can be provided, new users may be attracted in great numbers to materials they never even knew existed.[91]

Speech and image recognition promise new opportunities for automatic indexing, and digital restoration offers groundbreaking new techniques to 're-master' damaged materials or recordings of inferior quality. An increasing number of institutions choose to transfer analogue originals to digital formats to prevent contents being lost by wear-and-tear or being locked into an obsolete carrier. For tape-based materials of not-so-recent date digitization is now the preservation strategy of choice, particularly for audio where standards and well-defined recommendations for conversion have been developed.

However, the emergence of 'digital' does not only bring new opportunities but also the re-appearance of 'old' challenges that many audiovisual institutions are more than familiar with: rapid format obsolescence and a quick succession of generations of playback equipment, albeit this time in terms of digital formats, software and hardware. Institutions with audiovisual collections go through revolutionary times, 'needing to cope with the unknowns of digital preservation on the one hand, and the continuing preservation and access demands of the older "legacy formats" on the other.'[92] Opting for 'digital' will not always make life easier; it has profound effects on archiving practice, access demand and strategic planning.[93]

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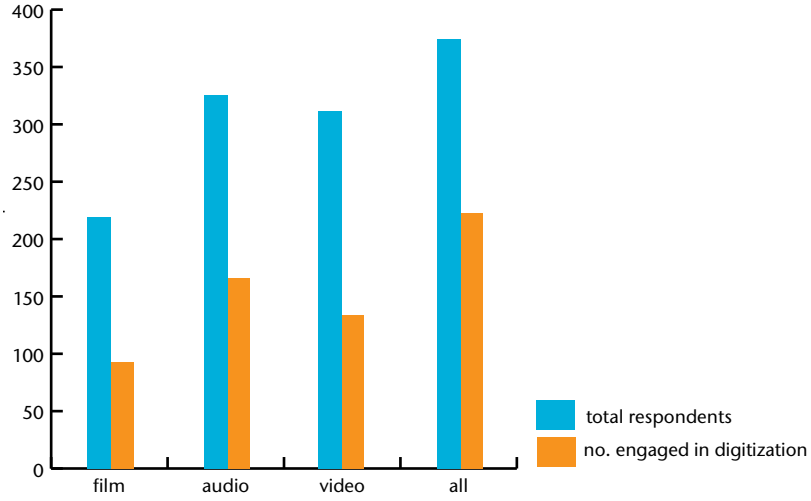
91 For instance, David Seubert reports how web access to an (underused) collection of thousands of commercial cylinders has resulted in millions of downloads. David Seubert, 'UCSB's cylinder preservation and digitization project: lessons learned', paper presented at the international conference 'Unlocking Audio', British Library, 26-27 September 2007. URL: http://www.bl.uk/collections/sound-archive/unlockingaudio.html.

92 Ray Edmondson, *Audiovisual Archiving: philosophy and principles*, 2nd revised edition, UNESCO, 2004., p.4, URL: http://portal.unesco.org/ci/en/ev.php-URL_ID=15592&URL_DO=DO_TOPIC&URL_SECTION=201.html.

93 Edmondson, *Audiovisual Archiving,* p. 3.

Figure 5-1 Digitization activity



5.1.1 General characterization of digitization activities

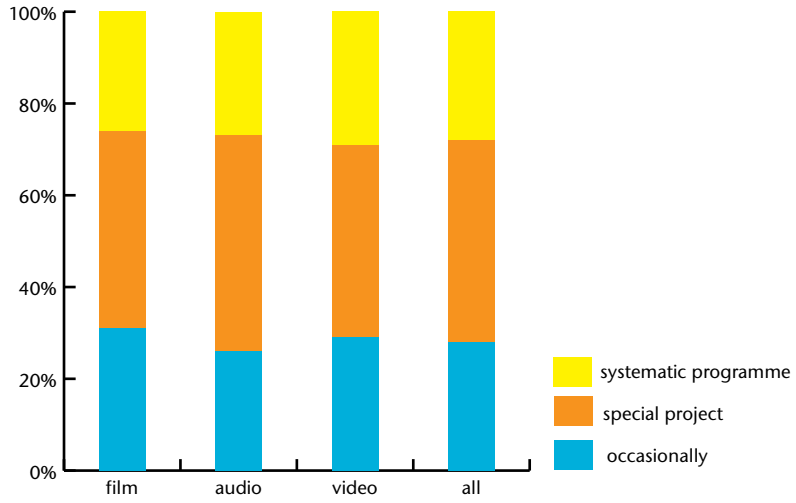
Of all 374 respondents to the survey about 60% indicate they are involved in digitization or are planning to start doing so in the near future. Institutions with a cultural heritage responsibility do not take a more active role in digitization than others.[94] The fact that those with fewer long-term responsibilities are equally active points to the important role of digitization for improving access.

Digitization is more often undertaken for audio collections than for film and video: about half the audio population is engaged in digitization (Figure 5-1). This is not surprising as audio tapes are on average older than video, and digitization standards for audio are relatively well established. In addition, the resulting files take up less space than those of moving images. All in all transfer of audio, also at preservation standard, is often both more urgent and more feasible. For video and film the share of respondents that indicate that they digitize (or are planning to) is around 40%.

Broadcasters, commercial companies and private collectors are more actively engaged in digitization than for instance museums and libraries. Research institutes seem to be particularly involved in audio digitization (almost 90% indicate they are converting sound recordings). This fits in with their assessment of the condition of their older tape holdings, which as a group they consider much more at risk than other respondents, as appears from their responses on the condition of carriers (see pp. 76-77).

94 Of the 181 respondents with a cultural heritage responsibility, 107 are digitizing or planning to do so.

Figure 5-2 Characterization of digitization activities



Total number of responses 217: film 97; audio 94; video 91.

There are some clear geographic differences, with more than an average level of digitization in for instance Finland, and only 15% of audio respondents from Italy digitizing audio materials, compared to for example 50% for Poland. Those with larger collections are more often engaged in digitization than those with smaller ones (for example, 75% of audio collections > 5000 hrs against 25% of audio collections < 500 hrs).

We were interested to what extent digitization has become an established, structural (preservation) strategy for audiovisual holdings and therefore asked respondents whether they had a systematic programme or digitized primarily in projects or on request. From the responses it appears that about 45% of all digitization takes place in special projects (Figure 5-2). Some of these projects could perhaps also be characterized as systematic programmes ('we plan to digitize our entire 3000 hrs film collection') while others mainly focus on the highlights ('we publish short and selected audio samples of published works of Finnish composers'). Projects like the latter are obviously done for purposes of access, to give users an impression of the holdings of the institution and showcase treasures from the collection. Rights issues may be a factor here, in that it is complicated or impossible to give access to more than a number of samples. Sometimes a select group of materials is digitized on the occasion of an upcoming exhibition, commemoration or other special event. A few institutions mention they cooperate with other organizations in a joint digitization effort and the creation of communal web-portals on specific themes like 'regional folklore and dialect

research', 'folk legends' or 'immigrant television programmes'. Some respondents – predominantly with audio – mention digitization projects that are undertaken to preserve deteriorating or frequently used materials.

A minority (27% for all media) have moved their digitization activities to the level of a structural programme, mainly archives, research institutes, and broadcasters. The research institutes that have a systematic approach are organizations focusing on folk culture, ethnomusicology and ethnology, and they are mainly involved in audio digitization.

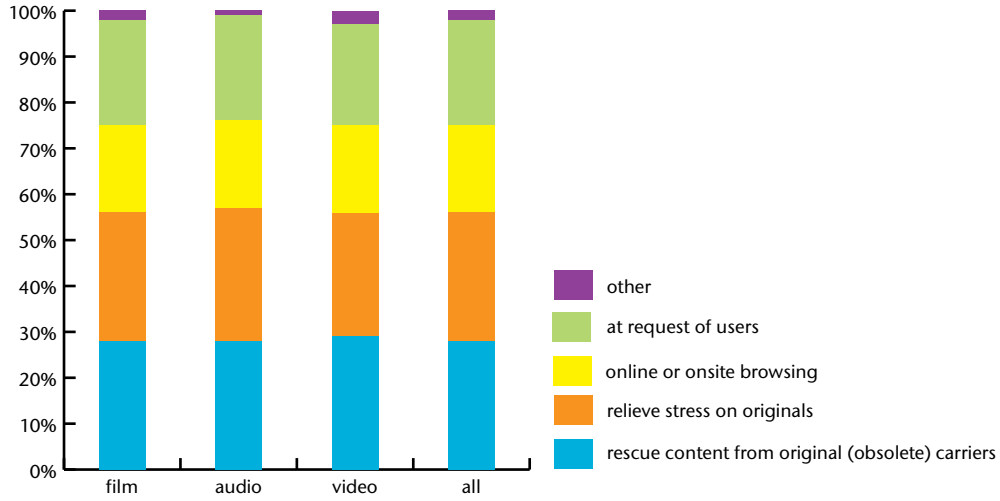
In many institutions different approaches will co-exist. It is likely that even when a structural programme for conversion of obsolete carriers is in place, some digitization will take place in projects related to other activities or at the request of users. Several respondents comment that they follow a mixed approach. From the comments it appears that in terms of media and carriers there is a wide range of priorities: films, cylinders, cassettes, 78's, U-matic, VHS are all mentioned. Some indicate they focus on valuable materials, others prioritize older carriers or materials in bad condition. A number of respondents add that their digitization activities depend on possibilities to acquire funding or are restricted by limitations of time: 'the work can only be carried out beside other duties'.

It has to be taken into account that in some cases respondents will not have primary responsibility for long-term preservation of (some of) the materials in their collection (it may be the task of another heritage institution to preserve these materials), that experience with new technology first has to be gained in projects of limited scope and duration, and that the situation will have further developed since we did the survey. Even so, the conclusion is still justified that digitization is only coming to be embraced as a structural activity. Many institutions have to try and come to terms with the new environment on the basis of temporary funding and are not in a position to plan ahead for building up expertise and developing infrastructure.

5.1.2 Why digitize?

When we asked respondents to indicate the main reasons for digitization, we made a distinction between transfer to a new carrier because the original one can no longer be used, and transfer in order to relieve stress on originals. The former would involve creating a new master at preservation quality to replace an original that is *de facto* abandoned (even though it may not actually be disposed of). This 'digitization for substitution' only applies when information can be captured at preservation standard and artefactual value of the original is low, as in the case of audio tape. Transfer to relieve stress on originals, on the other hand, is a preventive preservation measure, often used in combination with other preventive measures (environmental control, stabilization of the carrier) to extend the

Figure 5-3 Reasons for digitizing



Total number of responses 1367: film 337, audio 593, video 437.

useful life of the original which keeps its place as a primary source. Digital copies in this case are not meant to replace the original and could be access copies at a quality that does not match the original. This approach applies when digital copies cannot represent all the content of the original and/or the original has a certain value as an artefact, as in the case of film.[95]

One would therefore expect film respondents to employ digitization for different reasons than audio respondents: audio tape is considered an unstable carrier that can be replaced by a high-quality digital master, whereas film is a relatively stable carrier for which digitization for substitution is as yet in many cases not considered necessary or feasible. Yet, responses about the reasons for digitization are remarkably stable over the different media (Figure 5-3). Rescuing content from original (obsolete) analogue carriers and relieving stress on fragile originals are equally important reasons for digitizing, and the importance attached to them is almost the same for all three media. The two motives that only relate to access – providing copies to users and online/onsite browsing – are given less weight.

We suspect that the distinction we tried to make between digitization to create new archival masters on the one hand and digitization as a preventive measure

95 About digitization and preservation of film, see for instance Nicola Mazzanti and Paul Read 'Film archives on the threshold of a digital era: highlights from the FIRST project's final report.' Paper presented at the Joint Technical Symposium 2004, URL: http://www.jts2004.org/english/proceedings/FIRST.html#presentation. See also the article by David Pfluger about the 'problematic misconception' that digitization is necessary to 'save film for the future' ('Digitalisierung van Film', Memoriav Bulletin 14, August 2007, pp. 32-33).

to protect deteriorating originals on the other was lost on many of the respondents. Probably it is a theoretical distinction that does not work in practice. If interpreted strictly, the answers would suggest that digitization has been widely adopted as a preservation strategy for all three media, but this is not supported by the responses to the questions that followed, on archival masters and formats (see below), and contradicts anecdotal evidence we gathered as well as the literature on the subject. Many experts after all agree that for film 'digitisation is NOT a preservation strategy, at least not yet: film remains the safest carrier for high quality, high value film content'.[96] Therefore, only the more general conclusion seems in order here: that for most respondents preservation is the strongest argument for undertaking digitization of all three media. As one of them says 'the material is unique and nationally and internationally culturally significant, so that it is of the utmost importance to preserve it'.

5.2 Technical aspects

5.2.1 Archival principles

Unless one digitizes only for specific uses, like temporary web presentations, it is recommended to use open, platform-independent standards allowing high-quality capture of content. As heritage materials are meant to be kept 'forever' in a digital world where ten years is an eternity, the possibility of future migration and conversion is an important consideration in choosing a format. For long-term management, conversion to a specific format at a given point in time is not so much the creation of a new, definitive object but of a temporary file that allows safe and easy data transfer with the changing environment: 'file formats are subject to similar rapid obsolescence and evolution and the process of selection and assessment of options for preservation is largely one of risk reduction'.[97]

A major concern is the use of proprietary formats which are only supported by the company that develops the software needed to create and use those files. The succesive releases of new versions of a particular software package usually end the support of older generations and the associated file formats. The absence of the necessary technical documentation impedes the development of alternative software to access the data. For open standards, on the other hand, this documentation is available and hence they create a platform for anyone to develop their own software package. This makes open file formats less prone to lock-in and the kind of digital obsolescence that results from incompatibility of different generations of software. When it comes to digital preservation, open formats are therefore the format of choice.

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96 Mazzanti and Read, p.4

97 Digital Preservation Coalition, *The Preservation Management of Digital Material Handbook*, 5.2. URL: http://www.dpconline.org/graphics/medfor/formats.html.

In an archival setting uncompressed formats, or formats that use lossless compression, are ideally used for masters. Formats that use 'lossy' compression for reducing file size delete what is considered redundant data (a more correct term for compression is 'data reduction'), and loss of data is on principle not acceptable in archiving. Especially when information is compressed several times in the move through successive formats, data loss may affect quality and integrity of files. Ideally formats combine both the contents itself ('essence') with metadata in one container format (or 'wrapper'). The presence of metadata with the contents increases the chances that the file will always be recognized for what it is within its proper context and remain accessible also in new environments.

The downside of the use of uncompressed formats for audiovisual materials is that it results in bulky files which make heavy demands on storage space and bandwidth (one hour of digital video can take up to 100 GB of storage[98]). As a rule masters are stored off- or nearline, in case they are needed for backup or migration to a newer format, and access is provided to lower quality derivatives in compressed formats that are more portable. Such derivatives do not contain all the information of the original master file or need a specific algorithm to retrieve this information.

Any post-processing that is considered necessary to bring out the content (for instance because deterioration of the analogue original has affected sound quality) is undertaken on a copy of the digital master. This modified copy then becomes the intermediate, high-quality file from which further derivatives are made. In the digitization process itself no modification or correction of the signal (for instance to reduce noise) is applied, nor are such modifications supposed to be done on the archival masters. [99]

This means that of all digital objects, there will be several files in different formats, which, in keeping with the general rule in digital preservation that 'one copy is no copy', are kept in two or more copies. Archival masters in particular are ideally stored in several copies on different media and in different locations, to protect information against loss from media failure, breakdown of equipment, disaster etc.

The survey included questions on digital formats, but did not delve further into the specifics of the actual conversion process.[100] It should be borne in mind here that the first step, the initial extraction of the signal from the original ana-

98 'File formats for preservation', final report Erpaseminar, Vienna 10-11 May, 2004, p. 19. URL: http://www.erpanet.org/events/2004/vienna/Vienna_Report.pdf.

99 IASA Technical Committee, T*he Safeguarding of the Audio Heritage: Ethics, Principles and Preservation Strategy,* edited by Dietrich Schüller, IASA TC-03, 2005, section 8. URL: http://www.iasa-web.org/IASA_TC03/TC03_English.pdf.

100 A very detailed report on choices, conversion, workflow, metadata, problems and recommendations of audio digitization at Indiana and Harvard Universities is provided in Mike Casey and Bruce Gordon, *Sound Directions. Best practices for audio preservation*, Indiana University/Harvard University, 2007, URL: http://www.dlib.indiana.edu/projects/sounddirections/bestpractices2007/

logue recording in playback, determines the quality of what comes after. If the performance or settings of the playback equipment are faulty, this will be detrimental for capturing the contents. That is why technical expertise, not only on matters digital, but particularly on analogue carriers and playback equipment, is indispensable in digitization projects. Judging by the responses in other sections of the survey and given the fact that lack of playback equipment is often the reason for the transition to digital, this is likely to be a problem area for many institutions. As we do not have any data on this, the discussion of the use of standards for digital formats should not be read as an evaluation of the quality of the conversion process.

Main recommendations for audio digitization

The publication *Guidelines on the Production and Preservation of Digital Audio Objects* (IASA-TC04)[101] is generally regarded as the standard text for conversion of audio materials in an archival setting (UNESCO recommends these guidelines as best practice for audiovisual archives). It provides substantial technical background information and detailed advice on all steps of the conversion process.
A web document on the audio conversion workflow specifically for open reel tape has been published in the framework of TAPE.[102] It is a concise step-by-step summary that assumes less of a technical orientation than IASA-TC04 but follows the same principles.
Both publications stress the need of investing in optimal signal extraction from originals, requiring well-maintained replay equipment and expertise to adjust the settings of the machine to achieve a faithful reproduction of the original recording.
A few of the key recommendations in both publications are:

- To use as modern and as professional a replay machine as possible, but one that conforms to the specific characteristics of the format (e.g. speed, track format, equalisation);
- To use a stand-alone A/D converter and a high-quality sound card
- In order to capture as much information as possible, to choose a sampling rate of 96 kHz (at least 48 kHz, and where necessary 192 kHz) and encode at 24 bit (also if the analogue original recording is not of superior quality, as rich archival masters offer more possibilities for creating derivatives that adequately reflect the contents of the recording);
- To use PCM .wav files (preferably BWF .wav) as digital target format, and save the masters as uncompressed files.
- To document the conversion by generating as much metadata as possible about all technical details, such as original carrier, original recording, and transfer parameters (playback machine, settings, hard- and software versions used).

101 IASA Technical Committee, *Guidelines on the Production and Preservation of Digital Audio Objects*, International Asssociation of Sound and Audiovisual Archives (IASA), edited by Kevin Bradley, 2004.
102 Juha Henriksson and Nadja Wallaszkovits, *Audio Tape Digitisation Workflow for Analog Open Reel Tapes*, 2007. URL: http://www.jazzpoparkisto.net/audio/

5.2.2 Archival masters and derivatives

Whenever conversion to digital format is employed as a preservation strategy, the creation of a high-quality digital master is crucial. As expected, this is more commonly done for audio materials, for which conversion standards are most widely established and recommendations are available on how to produce an archival master.[103] Of all 133 audio respondents that answer the question on archival masters, 93 say they produce such files. The remaining respondents in some cases clearly explain why they do not: 'audio samples are on the internet for a limited period only, and we make no archival copy of them', one respondent comments.

The figures are lowest for film, which reflects the widely held view that current conversion technology cannot meet the quality requirements needed for such a master (yet): 'digitizing film requires very high sampling rates, i.e. resolutions and bit depths, in some cases higher than are realistic or possible today, to ensure that all the image data available is recorded as digital data.'[104] The respondents that nevertheless indicate they make digital masters of film may have assumed it concerns any high-quality digital copy (e.g. Digibeta). In fact, this interpretation of the question (which should have been formulated more clearly) is a logical one. Whereas many would not have problems with digital masters for audio that are uncompressed, for video and film files are nearly always compressed, to save space. Yet a moving image file can well be regarded as a master if it meets requirements for quality, is judged to represent the original content, and has not undergone further processing.[105] No wonder, then, that a respondent comments that 'the Archive has no technical possibilities to produce uncompressed film and video archival masters'. That limitations of storage are a reality is also pointed out: 'we have to compress because of the great storage space that film and video files require'.[106]

After analysing the responses and revisiting the underlying assumptions of the questions we have to conclude that particularly for film and video the requirements of a digital master that can be defined in theory (and which we did not make sufficiently clear) can often not be met in practice. Therefore in reality some

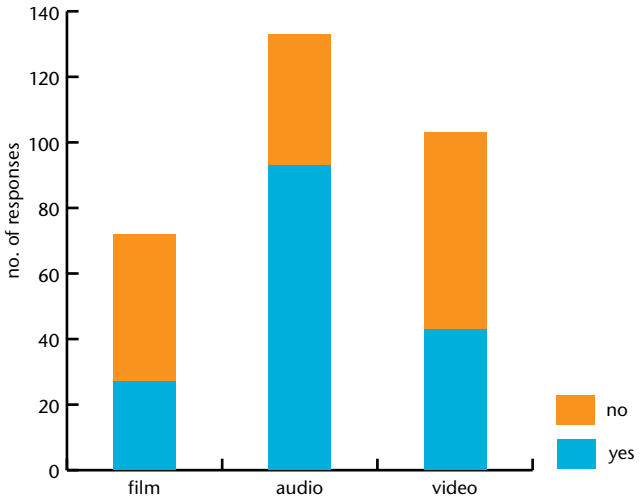
103 See IASA *Ethics, Principles and Preservation Strategy,* and IASA *Guidelines,* p.6.

104 Nicola Mazzanti and Paul Read, 'FIRST project's final report,' paper presented at the Joint Technical Symposium 2004, p.6. URL: http://www.jts2004.org/english/proceedings/FIRST.html#presentation. The authors go on to say that 'there have been suggestions that 35mm film needs as much as 10K, 20bit, scanning to acquire all the information on film, but this is primarily opinion, and not based on research.' At present 4K is possible but 2K is more common, and even this would without compression result in enormous files. They conclude 'there is no current consensus of opinion, or adequate research, on the correct resolution required for scanning film images', p.9.

105 Digitally recorded video (DVCAM, mini-DV) that comes into the collection in its native format and is left untouched may also qualify as master even though recording techniques depend on compression and proprietary formats.

106 Even though with the costs of datatape now at €150 per TB, one hour of video at 100GB on datatape would be less expensive than Digibeta (Richard Wright, personal communication). This, however, does not take into account costs of maintenance.

Figure 5-4 Uncompressed and uncorrected masters



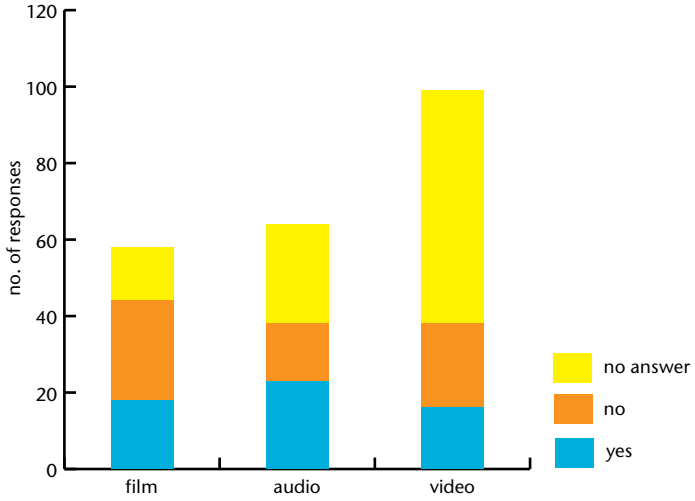
institutions create 'masters' that are the best they can achieve at this point in time (where the compromise may be that formats are proprietary, use lossy compression, or do not offer the quality one would ideally like). These files are 'masters' also in the sense that they are used to generate derivatives. Colleagues that use a strict definition, however, would not consider the same files to qualify as archival masters. This explains why one respondent explains they do not make archival masters because 'cinefilms and video recordings are transferred to DVCAM format (the best format we can afford)', whereas others say they use MPEG or DVD format for archival masters of film.

Whatever the definition respondents may have had in mind, when digitization is done to convert content from an obsolete or deteriorating analogue original to digital format, one would expect that respondents are more inclined to produce archival masters, especially in the case of audio (for which there is widepread agreement on the requirements for digital masters). The survey results do not support this. About half of the respondents that digitize to rescue content and that answer the question in the survey indicate they do not make archival masters (see Figure 5-5). For audio only 23 out of the total of 64 that digitize for preservation state that they produce archival masters.

5.2.3 Digital file formats

The question on which formats respondents prefer for digital masters and access copies yields a wide array of acronyms and reveals some uncertainty among respondents about technical matters. Although the question listed a number of

Figure 5-5 Archival masters produced by respondents that digitize to rescue obsolete carriers



possibilities to direct responses towards *file* formats, some answers concern carriers, like magnetic tape. Also, some typical audio formats like AIFF and WAV were given as formats for video, and analogue formats like VHS were taken for digital ones.

The consensus on preferred formats is highest among the audio respondents (Table 5-1), with two-thirds using WAV (AIFF, BWF) for masters. Very few respondents supply information on quality (sampling frequency and resolution) but of those who do most use at least 48 kHz and/or 24 bit. For film, Digibeta and MPEG-2 each account for a third of all master formats mentioned, for video MPEG-2 is the most common format. Very occasionally respondents add more information on quality (MPEG-2 25-50 Mbit/s, or MPEG-2 720 x 576 10 Mbit/s).

For moving image files compression and proprietary formats are at the moment impossible to avoid,[107] and there are several comments that make clear that under the circumstances respondents often still prefer to regard the analogue originals as masters. It is, for instance, well known that many institutions cannot

107 Some predict that with the introduction of the MXF container in combination with the Motion JPEG2k (MJPEG-2000) format (using lossless compression) the step towards an archival video format will finally be made. See for instance Media Matters, LLC, *Digital Video Preservation Reformatting Project*. A report prepared for the Dance Heritage Coalition, presented to The Andrew W. Mellon Foundation June 2004, URL: http://www.danceheritage.org/preservation/digital.html; Franz Pavuza and Julia Ahamer, 'Linear uncompressed video archiving on high performance computer tapes', paper presented at the 2004 Joint Technical Symposium, URL: http://www.jts2004.org/english/proceedings/Ahamer.htm; Ian Gilmour, 'Research report on JPEG 2000 for video archiving', 2007, URL: http://www.media-matters.net/whitepapers.html.

Digital video and audio file formats[108]

Audio and video in digital file format can be processed and stored on computer disks or tapes like any other computer file. Recording formats like DVCAM, DVPRO, mini-DV, Digibeta and IMX are also digital but they are each associated with a particular (proprietary) carrier and playback equipment. In order to use them in an IT environment they first have to be captured into a computer.

Digital file formats include codecs and containers. The digital data stream representing audio or video is encoded for transmission and storage, and decoded for viewing and editing, by a computer program or a codec. Most of these codecs are lossy: they use algorithms for compression and decompression that delete redundant data, for instance by removing data outside the human hearing range, or the data defining the same clear blue sky for each of a number of successive frames of moving images (interframe compression). Lossless codecs also exist; they create larger files but are preferred for archiving.

A container format is used to identify and interleave various types of data: the audio and video bitstreams –often called the essence- , metadata, subtitles and other information. Multimedia files combine audio and video (with separate codecs for the different bitstreams) encapsulated in a container together with, for instance, information for synchronization.

The number of formats is bewildering for anyone not working with this on a daily basis because of the many possible combinations of containers and codecs, the many generations and versions, and the different players that support some files but not all.

An extra complication is that file formats by themselves do not define quality: an MP3 file is always created with lossy compression, but sampling frequencies may be 32, 44.1 (CD Audio quality) and 48 kHz, and bit rates from 32 to 320 kbit/s may be employed, while moreover different encoders do not produce the same quality at the various specifications. Windows Media Audio files are usually (highly) compressed but there is also an uncompressed variety (using the WMA 9.2 lossless codec).

Although in their own projects for conversion of analogue materials collection managers can choose parameters to aim at archiving standards, they will more and more have to deal with this wide array of formats of born-digital materials created by others that are now beginning to enter into their collections.

AVI – AVI (Audio Video Interleave) is an older multimedia container format introduced by Microsoft in 1992 that can hold many different codecs (also uncompressed). Video codecs that are frequently used in .avi files include DivX, DV, and MPEG-4; audio codecs that are are supported include MP3 and uncompressed Pulse Code Modulation (PCM)

108 The *Digital Formats Website* of the Library of Congress presents extensive information on file formats for sound (URL: http://www.digitalpreservation.gov/formats/fdd/sound_fdd.shtml) and moving image (URL: http://www.digitalpreservation.gov/formats/fdd/video_fdd.shtml); formats, players, and compatibility are discussed at the Mediacoder wiki *Digital Audio and Video,* URL: http://mediacoder.sourceforge.net/wiki/index.php/Digital_Audio_%26_Video; at FileInfo.net URL: http://www.fileinfo.net/; and Wikipedia has many detailed pages on formats and players. PrestoSpace, *A Survey of Digital Formats for Storage*, 2006, PrestoSpace Deliverable D12-6, provides a critical evaluation of formats with a view to long-term storage and delivery of broadcast materials. URL: http://prestospace.org/project/deliverables/D12-6.pdf.

MPEG-1 – Audio and video compression format developed by MPEG group in 1993. Official description: coding of moving pictures and associated audio for digital storage media at up to about 1.5 Mbit/s. It was designed for CD storage and medium-bandwidth applications. MPEG-1 Audio Layer 3, specifying lossy audio-specific compression, is known as MP3.

MPEG-2 – A video standard meant for high-bandwidth/broadband usage and is not optimized for low bit rates (< 1 Mbit/s). Most commonly MPEG-2 is used for digital TV and DVD. MPEG-2 Part 7 specifies the AAC (Advanced Audio Coding) lossy compression scheme. AAC achieves better sound quality than MP3 at the same bit rate. Apple uses AAC for iTunes and it is the default audio codec for Sony's Playstation 3.

MPEG-4 – A more recent MPEG standard for a group of audio and video formats that has many applications but is primarily known for compression of video for streaming over the web.

MJPEG-2000 – video adaptation of the popular format JPEG which uses compression only on individual frames, so that there is no loss of quality of data.

MP3 – Audio compression technology that is part of the MPEG-1 specifications, using perceptual audio coding for lossy compression. MP3 is best known from its widespread use for peer-to-peer sharing and downloading music from the web.

WAV – WAV (or WAVE) is a container or 'wrapper' file format that can hold an audio bitstream with other data. The audio can be compressed, but the most common encoding is the (uncompressed) Microsoft pulse-code modulation (PCM) format. WAVE BWF is the broadcasting variety that differs only in that it stores limited metadata with the file. WAVE is the recommended format for archiving audio.

AIFF – Wrapper format for PCM encoded audio developed by Apple. Has the same functionality as WAVE.

MXF – 'Material Exchange Format' –open standard for wrapper that supports various (uncompressed) formats.[109]

streaming – Several formats are used for streaming audio and video over the web. All files used for streaming are heavily compressed. Formats include Windows Media, RealMedia, Quicktime, MPEG-4, Macromedia Flash. Most require their own player, usually a freely downloadable plug-in.

afford transfer to Digibeta, which offers high quality with low compression, but is relatively expensive. Moreover, transfer to Digibeta may help to move content from an obsolete tape carrier to a current one, but does not move it into an IT environment in which files can easily be copied between servers, harddisks, computer tape and optical disks and accessed in different ways. For many, this would therefore only constitute a partial solution for the management of different analogue formats, each dependent for access and playback on its own (proprietary) technology. It is, however, striking that for audio, where these dilemmas do not apply, a format like MP3 (and to a lesser extent CD Audio) is mentioned so often for masters, especially as the extra storage space taken up by uncompressed

109 Media Matters, *Digital Video Preservation*, pp.39-45

Table 5-1 Preferred formats for master and access copies

	masters	no. of resp.	access copies	no of resp.
film	Digital Betacam	14	MPEG-1	5
	MPEG-2	13	MPEG-2	15
	AVI	3	DVD	5
	other[1]	14	other[2]	27
	total	44	total	52
audio	WAV	90	MP3	46
	MP3	15	WAV	42
	Audio CD	5	Audio CD	10
	other[3]	17	Other[4]	28
	total	127	total	126
video	MPEG-2	28	MPEG-2	27
	Digital Betacam	11	DVD	8
	AVI	10	MPEG1	6
	other[5]	26	other[6]	24
	total	75	total	65

WAV including BWF and AIFF

1 Other master formats mentioned for film: MPEG-4, Quicktime (uncompressed), DVD, DPX, PGA, TIFF, magnetic tape, mini-DV, DVCPRO, XD-Cam, IMX, digital laserdisc.
2 Other access formats mentioned for film: MPEG-4, Quicktime, Windows Media Player, Windows Media Video, Betacam SP, DPX, PGA, mini DV, RealMedia, VHS, CD Audio.
3 Other master formats mentioned for audio: MP2, MPEG-2 (AAC?), CD-R, CD-Rom, DAT, magnetic tape, minidisc, LTO, MPEG-1.
4 Other access formats mentioned for audio: MPEG-3, CD-R, DVD, WMP, DAT, minidisc.
5 Other master formats mentioned for video: MPEG-1, MPEG-4, DVD, Quicktime (uncompressed), WMP, MXF, DV, DVCPRO, magnetic tape, mini-DV, XDCAM IMX.
6 Other access formats mentioned for video: MPEG-4, AVI, Windows Media Player, Digital Betacam, VHS, Shockwave.

formats like WAV is no longer a real issue. A general conclusion from an overall analysis of all responses is that, although there are clear trends towards the use of certain standard formats, there is also still a lot of uncertainty as to the choice of the best format, so that in practice a lot of digitization activity is restricted to the creation of access copies.

For access copies, most consensus on the preferred file format is found among video respondents, with nearly half of them mentioning MPEG-2. In the case of audio MP3 and WAV are equally popular for access copies. Quite a few comments refer to the use of several different formats for access, also depending on the requirements of users at whose request the files are created. This is one of the explanations for the many different access formats that are used.

5.2.4 Storage of digital masters and copies

Digitization of audiovisual materials has brought storage issues to the fore because the digital files, especially high-quality masters in formats using no or little compression, take up massive amounts of storage space. This involves more than passive storage on disks or tape, for files also need to be managed efficiently, for access today and with a view to future migration. When audiovisual materials are converted to computer (data) files (such as .wav), this introduces possibilities for monitoring of data integrity by the system. Checking the integrity of popular carriers such DAT (Digital Audio Tape) and optical disks (CD/DVD), which are known to be unreliable, is more cumbersome.[110] This is why for instance IASA advocates the use of a Digital Mass Storage System (DMSS), which is a computer system built around high-capacity hard-disk and tape storage allowing relatively rapid access and easy handling of the stored data.[111]

Large systems of this kind use fully automated robotic libraries and are expensive, primarily because of the cost of software and support. However, in smaller settings a scaled-down version of a DMSS can be set up as a cost-effective solution when one considers the advantages for data management over time.[112] Even if such a smaller system may not be fully automated, its capacity for error checking, refreshment and migration of large amounts of data, the possibility of combining hard-disk storage with archiving and back-up on tape (even off site), and the accompanying redundancy of data, make for a safer and more efficient environment than can be achieved by storage on media kept on shelves. Presto-Space summarizes the advantages as:

- *separation of coding and media*: digital files can be stored on any appropriate media, encoding formats are no longer associated with particular physical carriers, and migration can be accomplished by simple copying with 100% fidelity over many generations;
- *automated media management*: the system can access any storage device within its system without human intervention, an ability that can be used for 'automated media housekeeping', i.e. checking devices routinely taking into account usage, media age, batch performance and environmental factors
- *automated quality control*: the system can perform algorithmical checks of the integrity of the data objects (even those not accessed for viewing or listening for years) and correct errors due to media decay or noise in transcription without any user every having been exposed to the damaged material.[113]

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110 See Kevin Bradley, *Risks Associated with the Use of Recordable CDs and DVDs as Reliable Storage Media in Archival Collections*, Memory of the World Subcommittee on Technology, 2006, URL: http://unesdoc.unesco.org/images/0014/001477/147782E.pdf

111 IASA, *Guidelines,* p.48 ff.

112 IASA, *Guidelines*, pp.62-64.

113 Presto-Space, 'Mass storage obsolescence advantages', *Presto-Space A/V Archive Digitisation and Storage Guide* URL: http://prestospace-sam.ssl.co.uk/tutorials/T2/T2%2d1%2d3.html.

For the Presto-Space experts, abandoning discrete (analogue) carriers and moving content into the IT environment is primarily an opportunity for better management of their large (broadcasting) archives, so much so that they speak of 'obsolescence advantages'. One would therefore expect many institutions to use the IT infrastructure set up for many functions of the organization, including academic repositories, digital libraries and record management systems, also for storage of audiovisual materials. The same considerations for security and management of, say, the financial administration of an organization, surely apply to its core business, maintenance of the collections.

Yet a majority of respondents keep their digital files on optical disks. In 50% of the cases this is the preferred storage medium for master files, and when we isolate the group of dedicated audiovisual institutions it is still 40%. For small (< 500 hrs) and medium-sized (500-5000 hrs) collections it is a little more than half, of the large collections (> 5000 hrs) more than 40% use optical disks for master files. Of all respondents that use either DVD or CD (or both) to store their masters, 75% do not store them on any other medium. The 34 institutions that are currently using a DMSS are mainly national audiovisual institutions and a few large national archives and libraries.

One of the reasons behind this low uptake of new storage technology is no doubt the fact that many of the respondents in the survey manage minority collections in larger institutions in which the IT department may not appreciate the disproportionate but real need for large amounts of managed storage of this small part of the organization. It is not unknown for central IT services to recommend digital materials with a large appetite for storage to be written away on optical disk because the acquisition costs are so low. The extra work involved in creating the disks and the burden of managing them then also falls to those responsible for the collection. Although this approach involves more work and more risks (and may therefore ultimately be quite costly), presumably it is taken so often because it requires little cash. This may also be a factor in entrusting storage to third parties, whether trusted repositories managed by partner institutions or commercial vendors that specialize in storage solutions.

Table 5-2 Storage of digital masters and copies

	masters	high-quality copies	access copies	total
computer tape	35	14	9	58
hard-disks	38	30	35	103
optical disks (CD-R,DVD)	128	101	130	359
digital mass storage system	34	21	18	73
other (Digibeta, DAT, DVCAM, laserdisc, server, mini-DV)	23	12	7	42

Digitization means creating new objects – and taking care of them, without abandoning the originals. Practically all respondents keep the analogue originals after digitization. Of the few that reply they do not (5-7%), some add they return the analogue materials to the rightful owners or to third-party storage facilities. Apparently it was considered almost an insult that we asked the question at all, for it stirred up some strong feeling among respondents: 'IT IS CRIMINAL TO DESTROY ANALOGUE ORIGINALS' comments one, and 'professional ethics obligate to save originals waiting for new more effective technologies', says another. The position that analogue materials should be kept for future conversion is taken by other respondents as well.

5.3 The digitization process

Of all respondents involved in digitization about one-third (74 respondents) say they (are planning to) outsource (part of) the process to third-party organizations. Whether this relates to film, audio or video digitization cannot be determined from the survey data, but judging from the composition of the group of respondents it probably concerns all three audiovisual media. Some respondents specify formats that they outsource for digitization: films, audiocassettes, DV to DVD/video and open reel tapes 'with problems'. One large national film institute contracted a specialized company to do high-quality, professional digitization for preservation.

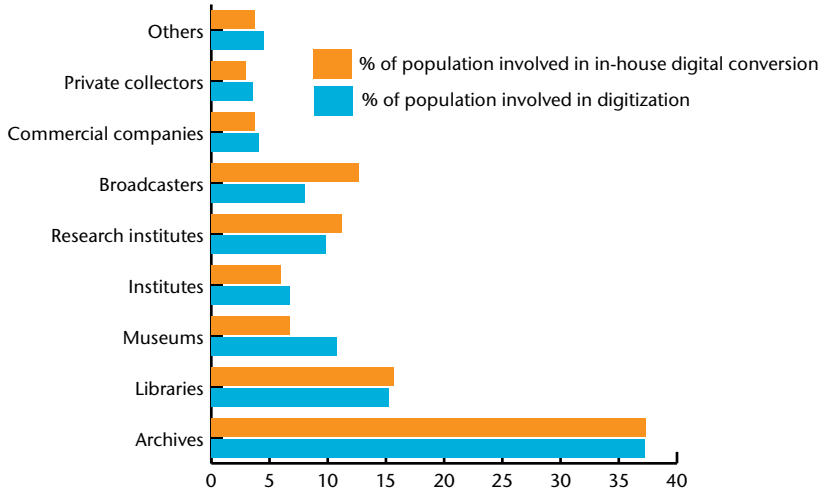
The majority of respondents do their own digitization or keep most of the activities in the digitization workflow in house. Of the whole process, digital preservation/migration and development of (web) interfaces are the only activities that a minority do in house.

It seems somewhat contradictory that a large majority of respondents plan to store their own digital files and yet only a minority see themselves taking care of migration and digital preservation. Given the fact that for most respondents

Table 5-3 In-house digitization activities

	no. of responses	% of all respondents that (are planning to) digitize
selection and preparation	188	84%
cataloguing and metadata	180	81%
storage	171	77%
providing copies on request	137	61%
conversion from analogue to digital	134	60%
processing of files to make access copies	126	57%
migration and digital preservation	92	41%
providing access through web interface	65	29%

Figure 5-6 In-house digital conversion per sector



preservation is the main argument for digitization, it is unlikely that this difference of 35% can be ascribed entirely to the production of access copies that are not meant to be kept for the long term, nor can it automatically be assumed that the 60% who do *not* regard digital preservation as an in-house activity have all outsourced the task. Some may have, and those who have stored files on optical media may consider future migration a job to be outsourced when the time comes. Probably the dissociation of storage and digital preservation in the responses to some extent reflects the current situation that many respondents do not yet have a strategy for migration and digital preservation in place.

About 60% of all institutions that (are planning to) digitize do the actual conversion from analogue to digital in house. The composition of this group of 134 respondents reveals that in-house digital conversion is particularly prevalent amongst broadcasters (who will have all the technical facilities to do their own digitization) and research institutes (which, as we have seen above, are mostly involved in audio digitization). Museums – as opposed to other sectors – show a clear tendency to outsource digital conversion (Figure 5-6). Film respondents are far less inclined to keep the digital conversion process in house than their audio and video equivalents (44% versus 64/60%). This may be related to the technical complexities of digitizing film that requires expensive equipment, it may also be a consequence of the cooperative model that we have seen before, of smaller archives depositing their film with large film archives and receiving (digital) access copies in return. Moreover film respondents are traditionally more familiar with outsourcing through their long dependency on film labs and may be less reluctant to outsource digitization activities.

The size of collections only makes a difference as to the overall level of in-house involvement: for audio, for instance, institutions with large collections (> 5000 hrs) do more work in house (an average of 75% for all activities taken together) than those with small collections (< 500 hrs, average 54%). However, in all institutions the level of in-house involvement in the various activities follows the same order.

5.4 Main obstacles

Pressure on cultural institutions to open up their collections by converting their holdings and providing web access is strong, from the (European) political level to that of the user who expects to find things online. Institutions are eager to digitize materials, also for the advantages it offers for preservation and management of collections. But they are also hesitant to deliver the materials in their care to the evolving digital environment. When asked what the main obstacles are to embark on large-scale digitization programmes, more than 160 of the respondents take the opportunity to list pressing issues, and many of them referred to several different problems they see themselves faced with.

Most of the comments somehow relate to standardization and longevity; 'possibility of quick changing of digital technologies in the future, incompatibility of different digital technologies'. Uncertainty about the life expectancy of the storage media ('will the CDs and DVDs still be readable in 10 years' time?' 'Haltbarkeit der Träger nicht langfristig') is an issue repeatedly brought up, and 'the wide variety of media' is another cause for concern. Because there are 'vast amounts of different formats' to choose from and no agreement on standards there is 'lack of knowledge as to what format to use'. The risk that a format one chooses will not survive is perceived as a risk that discourages the move to digital: 'ein einheitliches, alterungsbeständiges Format fehlt bisher'; 'poca fiducia 'el supporto digitale'; 'uncertainty about long-term maintenance, still rely on analogue too'. The lack of quality standards for digital conversion is associated mostly with video ('the digitalisation of video was delayed because of the lack of know-how (variety of standards))'; 'the lack of a preservation standard for video digital files is a big problem') and film ('Film/Video: technische Entwicklung noch nicht ausgereift'; 'for films the preservation & the quality of digital copies'). The costs of digitizing 'at preservation quality' are felt to be prohibitive.

Lack of expertise and sufficient staff with technical knowledge are also at the top of the list: 'we have not yet systematic plans for digitisation because of the lack of know-how', 'lack of specialized knowledge/competency/personnel'; 'mancanza (…) di personale completamente dedicato con opportuna preparazione tecnica'; 'conocer a fondo los procesos y formas de digitalización'; 'finding suitable staff members who have both a technical knowledge and can develop a long term planning'.

Expertise is not only felt to be insufficient when it comes to new technology, operators that have the expertise to work with older equipment are also hard to find: 'skilled personnel is retiring, (lack of) maintenance skills and spare parts of older equipment'. The lack of proper playback equipment of analogue carriers complicates digitization work: video playback equipment does not work properly, or is lacking: 'отсутствие видеомагнитофонов для перезаписи с устаревших носителейt'.[114] There is the problem of replaying tapes recorded on machines that differ from those available now, 'a lot of differences in tapes and in the way in which they are recorded'. The need for professional training so that staff can acquire new skills is a related issue that respondents mention: 'there is a lack in training courses on digitization and storage of AV-collections'. Some respondents feel national institutions should provide more training and guidance.

The preparation phase of a digitization process poses serious problems for many respondents. A considerable number report trouble with copyright clearances; 'copyright is a big problem, at the moment it is illegal to digitize, or asking permission from the rightholders takes too much time'; 'most of our material is protected (…), at present we can only make access copies available in-house'; 'nachträgliche Einverständniserklärung der Urheber zur öffentlichen Zugänglichmachung, Suche nach Urhebern'. Finding reliable contractors is also mentioned several times: 'outsourcing is inconvenient, slow and risky'. Cataloguing is a problem area, not only because of lack of adequate descriptions ('unzureichende Erschließung (beschlagwortung, wissensbasiert, semantisch) des Archivmaterials') and cataloguing software ('un buen programa informatico de descripción') but also because new approaches are needed: 'archives will have to be reorganized so that things that belong together are brought together by way of descriptions'.

In the digitization process, the 'delicate nature of the material' can be a real obstacle: 'the material is deteriorating which makes the digitisation process more difficult'; 'tener que trabajar con materiales originales que ya han sufrido los efectos negativos del paso del tiempo, debido a su mala conservación y por agresiones de tipo ambiental tales como el polvo, la humedad relativa o la temperatura'. For several respondents, the preservation of analogue originals, 'lo stato di conservazione dell'originale', is a main concern in digitization projects, which involves 'deciding whether to keep the original media'.

A few respondents mention the need for developing a streamlined workflow, but 'that requires staff, equipment, training, consistent long-term funding and a well-designed and maintained process', and a number mention problems with (digital) storage.

114 'absence of video players to transfer from obsolete carriers'

For some the main obstacle is lack of interest or support in their own institution, which is related to the position of audiovisual as a minority collection. They refer to lack of awareness with the owners or keepers of materials, or a low priority given to the audiovisual collection: 'no obstacles other than the fact that the material is not a priority given the size of the paper based collection' 'the emphasis is not on the AV-material' 'the relatively little amount of AV-material, lack of concern'. Possibly other problems that are mentioned also point to insufficient appreciation of the specific needs of minority audiovisual collections, for instance in the case of storage. High-quality digital copies make exorbitant demands on storage facilities: an hour of digital video with high-level MPEG-2 compression absorbs almost 25 GB.[115] Such figures are staggering for institutions working in a text-oriented environment. It means that the demands for storage for one minority collection may require an organization to take its storage strategy to a whole different level and this, of course, is not easily achieved. Priorities within the organization will obviously also affect the amount of staff, equipment and resources made available for audiovisual digitization.

We asked respondents to list the main obstacles to digitization, except lack of funding: given the scope of the task at hand, everyone knows there will never be enough resources to do all that could be done. Many of the problems that were mentioned cannot simply be solved by more money: one cannot buy expertise that is not available, organizational problems eat away resources but are not necessarily solved when more money is made available, and in order to get more funding one has to increase awareness and gain support, not the other way around. But for quite a few respondents the main problem is still time or money or both: 'lack of time and resources in addition to lack of funds' 'equipment and personnel = economical reasons', and 'lack of funds is by far the most important obstacle: with money you can get more training, equipment, and premises'. And that, of course, is also true.

115 According to the Presto Storage Calculator http://prestospace-sam.ssl.co.uk/hosted/d12.2/calc4.php

Access and use

6

6.1 Introduction

Dependency on a variety of obsolete playback equipment, and inadequate descriptions that hinder effective search and retrieval are the two main barriers blocking access to audiovisual collections. Digitization can remove the former, but does nothing to improve access if the latter is not dealt with. Whereas with many text materials a high level of access can be achieved with minimal descriptions complemented by searching of automatically generated text (with the use of OCR techniques), for sound and images there is no equivalent technology. Computerized systems can facilitate cataloguing, but when it comes to description of audiovisual materials, no machine can rival human eyes and ears and interpretation.

Broadcasters are investing heavily in an all-digital environment, in which new productions and archived materials should ultimately all be searchable through one media information system that provides access to different layers and for different types of users.[116] The idea is that, say, a complete news programme as broadcast, as well as the individual items of which it is made up, and the raw material from which these items originate, are all linked up through extensive metadata. To limit the time invested in creating descriptive metadata, broadcasters are looking at sound and image recognition for automatic metadata extraction to support cataloguing.[117] Ideally information should be structured so that all types of users, from programme makers to school children, are able to find what they are looking for, even though they use very different parameters for searching.

Such a multi-layer system not only facilitates re-use of older materials in new programmes, it also helps to manage rights. A variety of rights may be associated with the programme as a whole and its constituent parts, and a system that contains all data on rights for all versions of the content can be instructed to allow different levels of access to specific user groups. Use of audiovisual materials for educational purposes, for instance, requires that licensed schools and universities are allowed access to presentation formats of select materials.[118]

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116 For a concise description of media information systems, see Annemieke de Jong, *Metadata in the Audiovisual Production Environment. An introduction*, Nederlands Instituut voor Beeld en Geluid 2003. For metadata standards in broadcasting see the PrestoSpace report *Analysis of Current Audiovisual Documentation Models. Mapping of current standards*, PrestoSpace Deliverable 15-1, 2005. URL: http://prestospace.org/project/deliverables/D15-1_Analysis_AV_documentation_models.pdf.

117 See, for example, the MuNCH (Multimedia Analysis for Cultural Heritage) project http://ilps.science.uva.nl/munch, or work done on multimedia retrieval at the University of Twente (The Netherlands) URL: http://hmi.ewi.utwente.nl/topic/Multimedia%20Retrieval. For an overview of tools see PrestoSpace, S*tate of the Art of Content Analysis Tools for Video, Audio and Speech*, Deliverable 15-3, 2005, URL: http://prestospace.org/project/deliverables/D15-3_Content_Analysis_Tools.pdf.

118 IMMix, developed by the Netherlands Institute of Sound and Vision is an example of an information system that aims to support production, rights management, search and retrieval through an elaborate metadata model. Annemieke de Jong, 'Metadatamodel biedt gebruiker diepte en structuur: de facetten van een audiovisueel product' (Metadatamodel offers user depth and structure: the facets of an audiovisual product), *Informatie Professional*, 2007 (6), pp.16-21.

Large programmes to create access to audiovisual heritage, particularly for education, are under way in several countries. The *Archival Sounds Recordings* website of the British Library makes 12,000 audio recordings available for higher and further education. The Dutch *Teleblik,* with thousands of hours of television materials for all age groups, includes a tool to digitally cut-and-paste fragments for personal use.[119] This fits in with the present interest in types of access that not only allow consultation but also re-use, an interest which is growing as a result of the Web 2.0 wave that now sweeps the internet landscape. Apart from offering materials on their own or related sites for narrowcasting, a number of broadcasters now have their own channel at YouTube with dozens or even hundreds of clips for people to share, by posting the clips themselves or links to them on their own websites.[120] Most of this consists of fairly recent television programmes, but the Netherlands Institute of Sound and Vision, for instance, also posted historical films. Historical film has also been made available by the British Film Institute in the framework of the 'Creative Archive', a site the BBC set up with partners to encourage creative re-use of some of their materials by the public.[121] For some this is the direction in which heritage institutions should be moving:

> Media like Internet and digital television cannot and must not be reduced to a global archive, a static tomb for data, audio and video. It is up to those who assemble the content, the broadcast networks, the centers for video and media art, the libraries and museums, to create their own networked context within the abundance of content, in order to provide a valuable framework for education, communication and interaction, in order to build virtual spaces as seedbeds for the exploration of digital audiovisual languages and forms.[122]

The question arises to what extent collections dispersed over many different types of institutions can become part of this bright new world, as the level of digitization and description that will be needed may seem futuristic. It requires not only digital conversion of analogue audiovisual holdings but also the development of hierarchical integrated information systems and production of massive amounts of metadata, which, as some hope, will be facilitated by the use of semantic web technologies. Our questionnaire included a number of questions on access and use that shed some light on the gap that still has to be bridged.

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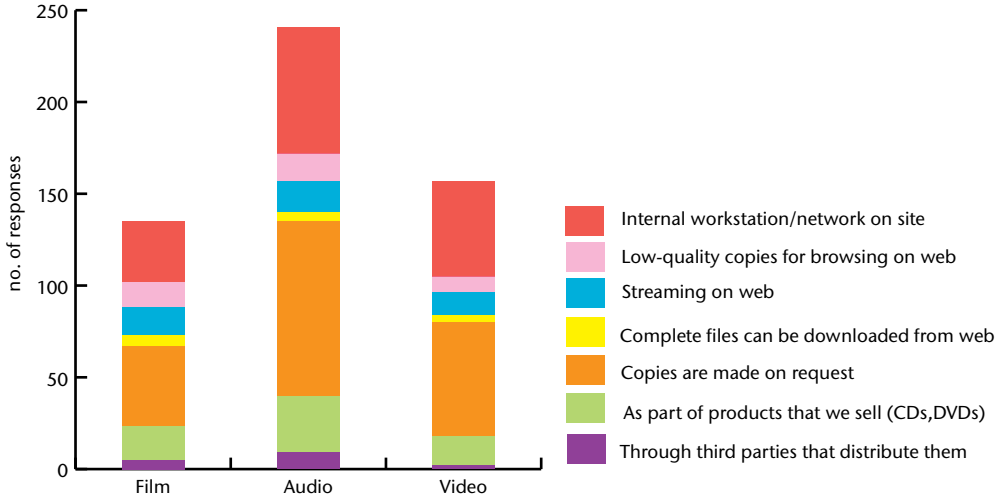
119 Archival Sound Recordings URL: http://sounds.bl.uk/Default.aspx, Teleblik URL: http://www.teleblik.nl.

120 BBC Worldwide URL: http://www.youtube.com/user/BBCWorldwide; Netherlands Institute for Sound and Vision URL: http://www.youtube.com/user/BeeldenGeluid; RAI URL: http://www.youtube.com/user/rai; Radio Televisión Española URL: http://www.youtube.com/user/rtve; ZDF URL: http://www.youtube.com/user/zdf.

121 See http://creativearchive.bbc.co.uk/.

122 Stoffel Debuysere, 'Culture intercom redux. Audiovisual media in a network culture.' *Content in Context. New Technologies for Distribution*, Netherlands Media Art Institute, n.d. (2005), pp. 54-55.

Figure 6-1 Access to digital collections



6.2 Consultation

For consultation of original (analogue) audiovisual recordings, most institutions have on-site facilities, but when asked about problems in managing their collections, around a quarter of the audio and video respondents to this question report lack of playback equipment to be an urgent issue (see pp. 78-79; pp. 82-83). It is therefore obvious that some materials cannot be consulted at all. Many respondents indicate they provide analogue or digital access copies at the request of users, and almost all respondents involved in digitization (approximately 85%)[123] provide digital copies of analogue originals to their users, even if it is not their main reason to digitize (see figure 5-3).

The digital collections of the respondents in the survey mostly consist of digital copies of analogue originals that are accessible through local networks on site. Internet access is limited, as legal restrictions often keep institutions from making materials available online, even as low-quality browsing copies. Those respondents that have placed digital audio or video online often only make a small part of their collection accessible, or some sound extracts or film fragments representing the 'highlights'. Since the time these responses were collected, internet access to selected items will no doubt have increased, also because familiarity with the technology has become more widespread. Given the fact, however, that the majority of respondents did not have a structural digitization programme in place and that rights issues complicate web presentation on the web, online access to complete collections is in no way near – not to mention free and open access.

123 Film 82/93(88%), audio 146/166 (87%), video 105/134 (80%)

6.3 Documentation

In the words of Ray Edmondson 'careful documentation and collection control – "good housekeeping" – is a precondition for preservation.'[124] Metadata ('data about data') – formerly known as 'descriptions', 'catalogues', 'inventories', 'captions', etc. – is the structured information that 'describes, explains, locates, or otherwise makes it easier to retrieve, use, or manage an information resource.'[125] They are the key to every collection, and their quality determines whether information can be retrieved. What cannot be found might just as well not exist.

Of all 374 respondents, 323 either provide access through an electronic system and/or a paper-based catalogue. Of all respondents, 60% provide on-site access to the catalogue, whereas a quarter (also) make their catalogue available over the internet, sometimes in restricted environments that require authorization. A number of respondents have made their catalogues available on CD-Rom.

As has been mentioned above (see p.27, p.70), for about a third of all respondents **cataloguing is a top priority issue, and many comments concern incomplete** knowledge about the content and condition of their collections as a consequence of inadequate cataloguing. With the move to the online environment, the urgency to catch up on cataloguing backlogs and improve the quality of catalogues becomes more pressing than ever before. The problems that incomplete cataloguing causes in the analogue world are serious enough in themselves, but digital materials cannot be managed and become completely invisible without sufficient metadata. The possibilities for searching that the digital environment offers moreover leads to high expectations on the part of users. Now that massive amounts of data and text can be searched in a fraction of a second, audiovisual information will have to be described at such a level of detail that meaningful items can be retrieved easily. As this is immensely time consuming, broadcasters are looking at automated systems for creation of metadata, using image recognition, speech recognition and technologies for natural language processing that can index, for instance, subtitles and other associated texts. But for heritage collections, there is no technology around the corner that will provide shortcuts.

The biggest problem with cataloguing that they have to deal with is simply the lack of it. About 40% of all respondents indicate they have uncatalogued materials in their collections (see Table 6-1). On average, they estimate that about a third of their audiovisual collections has not been catalogued. Even the specialized audiovisual institutions still report an average backlog of around 20% of their total

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124 Ray Edmondson, *Audiovisual Archiving: philosophy and principles*, 2nd revised edition, UNESCO, 2004, p.56. URL: http://portal.unesco.org/ci/en/ev.php-URL_ID=15592&URL_DO=DO_TOPIC&URL_SECTION=201.html.

125 NISO, *Understanding Metadata*, 2004, p.1, URL: http://www.niso.org/standards/resources/UnderstandingMetadata.pdf. See also: NISO, *A Framework of Guidance for Building Good Digital Collections*, 3rd edition December 2007, pp.58-85. URL: http://www.niso.org/framework/framework3.pdf; Tony Gill, Anne J. Gilliland, Mary S. Woodley, *Introduction to Metadata. Pathways to Digital Information*, Version 2.1, URL: http://www.getty.edu/research/conducting_research/standards/intrometadata/index.html.

Table 6-1 Respondents with cataloguing backlog per sector

type of organization	no. of respondents	% of survey population for this sector	average backlog in % of collection
archives	57	40	45
libraries	32	40	27
museums	18	43	24
institutes	8	31	15
research institutes	9	32	22
broadcasters	6	29	15
commercial companies	4	40	49
private collectors	5	56	41
others	5	29	35
	144	38	30

audiovisual holdings. Larger audiovisual collections have a lower percentage of uncatalogued materials than smaller ones, probably because large or specialized institutions can afford to hire staff specifically for cataloguing. Moreover, among these large collections there are a number of broadcasters, for whom, as they are operating in a demanding production environment, the urgency to have up-to-date, reliable catalogues has always been very high. That many institutions with small and in theory manageable collections have relatively large backlogs is another indication for a general impression that in mixed collections audiovisual materials, as nonstandard items falling outside the established routines, have suffered from neglect.

Cataloguing backlogs are found more often in archives than in other sectors. About 40% of all respondents from archives report they hold uncatalogued materials, and on average they estimate their cataloguing backlog at 45% of their overall audiovisual holdings. Some respondents explain they only have lists or inventories ('we only have a summary document of our holdings', 'as helping aid we use inventory lists that in no way meet the requirements of proper archival access').

The main reason for these backlogs is lack of time and resources. As one respondent writes 'cataloguing is slow' , and catching up on the backlog is not always a priority. Sometimes it has to be done besides other activities, or as one respondent puts it: 'demands of running a public search room limits staff time for background jobs'. This is particularly true for smaller institutions or collections without specialists employed specifically for cataloguing where a couple of staff have to do all the work. Working on cataloguing backlogs then soon becomes a 'background job', of less urgency than many other matters that present themselves. Another reason given for the cataloguing backlog is the impossibility to view the contents for lack of playback equipment.

Table 6-2 Metadata in digitization

	no. of responses	%
We spend a lot of our time on optimizing descriptive metadata	40	21
Only the most serious problems are addressed, to limit the time spent	50	26
The descriptions are mostly okay so we do not need to do a lot of work on them	55	29
The descriptions are not adequate, but we have no resources to improve them	25	13
Other	20	11
	190	100

Problems are not restricted to backlogs with cataloguing, but also concern the level of access provided by existing descriptions: '100% described at collection level, but only 18% at item level', 'everything can be found, but not on the same level of detail' and 'the level of access is very different' are only a few of the comments respondents provide to express their dissatisfaction with the level or quality of cataloguing.

As metadata of digital materials should meet certain requirements in order to make management and retrieval possible, digitization projects usually involve substantial work on descriptions and therefore may have a positive effect on the quality of cataloguing. 'All material that has been digitized is also catalogued', an audio archive comments. Experience has shown that in nearly every digitization project updating and complementing descriptive metadata is a serious stumbling block. Even when a seemingly adequate catalogue exists, when a digitization project is undertaken the inconsistencies come to the fore, and if searches are to yield the expected results, additions and corrections turn out to be necessary. Institutions may also find that they need to adapt their own metadata in order to make materials available in joint projects with others or through a portal.

Half of the respondents to the question on work on metadata in digital projects report that their descriptions are adequate for the purpose. About 20% indicate that they spend a lot of time on improving descriptive metadata (Table 6-2). Due to lack of time and resources about 25% have to limit themselves to the most serious problems. Another 15% think their descriptions are inadequate but see no possibility of improving them. One large national library comments that part of the metadata was generated automatically (presumably this concerns technical rather than descriptive metadata).

6.4 Descriptive models

'The harmonization of the various cataloguing rules within the audiovisual field, which have separate historical origins, and the evolution of manuals, minimum data and metadata standards, is an ongoing cooperative task for cataloguers worldwide', Ray Edmondson wrote in 2004.[126] As a consequence of different

126 **Edmondson,** *Audiovisual Archiving,* p.58.

Table 6-3 Use of standard and/or guidelines for cataloguing/description/metadata

	ISAD (G)	ISBD (NBM)	MARC	FIAF cat. rules	IASA cat. rules	Dublin Core	other[1]	total
archives	3	6	2	8	1	8	25	53
libraries	1	35	19	2	6	5	22	90
museums	0	2	0	2	0	1	9	14
institutes	0	3	1	2	1	0	5	12
research institutes	0	2	1	0	2	2	7	14
broadcasters	0	0	0	1	0	1	6	8
commercial comp.	0	0	1	0	0	0	5	6
private collectors	0	0	0	0	1	0	1	2
others	1	0	1	1	0	0	4	7
total	5	48	25	16	11	17	84	

1 Own system, national standards or guidelines, combination of standards, MPEG7, AACR2.

perceptions of the audiovisual document and different traditions of cataloguing many variations exist in emphasis, standards, and the range and contents of information fields. Now that projects are developed for joint presentation of digitized materials and searching can be performed through several collections simultaneously, issues of interoperability and exchange of metadata have become much more relevant than in the time when every collection was accessible only within the walls of the library or archive that kept it.

Since no generally accepted descriptive model exists specifically for audiovisual materials, institutions either use national or international standards developed for other materials (and sometimes adapt them for their own purposes) or develop models of their own. Respondents to the survey mention a wide range of different standards and models. Sometimes they use more than one model, for different purposes, for instance MARC to catalogue and Dublin Core to exchange records with others (Table 6-3).

The choice of a descriptive model is often a matter of preferred practice within a sector, but not all institutions necessarily employ the standard that is supported in their sector. For instance, whereas the library respondents in the survey frequently mention a library standard such as ISBD(NBM), archives appear to be using its archival counterpart ISAD(G) only infrequently. Of all sectors the archives are the ones with the widest range of different descriptive models.

Some respondents mention it would be more efficient if there were a standardized, central information resource on audiovisual materials such as LPs, music CDs and DVDs: 'The main problem of all archives is the lack of a free, global and reliable database for commercially produced AV-carriers, so that not every archive will have to do this time-consuming and accurate work themselves', one audio respondent writes. 'Temporary solutions like national or label discographies would help', he adds. In Finland for instance there is a national discography

Dublin Core

Dublin Core is a core schema of 15 recommended elements, meant to facilitate exchange of metadata amongst different collections. It is not a descriptive model, but a set of guidelines with the initial aim to promote standardization on an interoperable level. In 2003 DC became an ISO-standard (ISO 15836). Today DC has developed into a very popular exchange format for libraries, archives and – to a lesser degree – museums, to connect their catalogues and provide shared search-and-retrieval services. See website at: http://dublincore.org/

1. Title
2. Creator
3. Subject
4. Description
5. Publisher
6. Contributor
7. Date
8. Type
9. Format
10. Identifier
11. Source
12. Language
13. Relation
14. Coverage
15. Rights

Dublin Core and Audiovisual Documents

Scandinavia Representatives of State & University Library, Århus, National Library of Norway and National Archive of Recorded Sound and Moving Images agreed in 2001 on a specific interpretation of Dublin Core for exchanging their cataloguing records on AV materials URL: http://www.nrk.no/informasjon/iasa/metadata/1009552.html

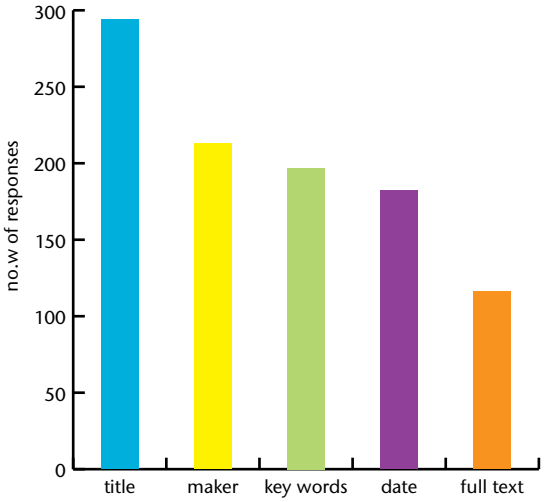
AMIA/LOC AMIA, with the Library of Congress, has launched a major National Science Foundation-funded initiative called MIC: Moving Image Collections, which is currently working on a mapping to Dublin Core for film collections. URL: http://mic.imtc.gatech.edu

IMAP Independent Media Arts Preservation, Inc. (IMAP), a nonprofit service, education, and advocacy organization committed to the preservation of non-commercial electronic media provides easy-to-use cataloguing templates for cataloguing film and audio to its users, including a mapping to Dublin Core and MARC. URL: http://www.imappreserve.org/cat_proj/

in MARC format available on the internet which proves to be a support for institutions in cataloguing not only the music itself but also sheet music and videos of concerts.

By exchanging standardized records institutions may lighten each other's cataloguing burden and improve the quality of the cataloguing records. There are some respondents who mention that they use MAVIS (Merged Audio Visual

Figure 6-2 Possible searches in current system



Information System). With MAVIS, catalogue records are hosted by a central organization and made available to other users from a centralized system. ScreenSound Australia, one of the major stakeholders of MAVIS, hosts catalogues for other institutions like, for instance, the Southeast Asia-Pacific Audiovisual Archive Association (SEAPAVAA).[127]

Because so many models and standards are being used, sometimes with very different structures, elements and rules, exchange of records can be extremely complicated. Conversion or export of large databases that are organized on a certain model to another one is hardly ever without its problems and often simply not feasible. To combine catalogue records from different sources, 'mapping' of the most important elements is the more usual route. Dublin Core has now become a popular intermediate metadata standard to facilitate searching through digital collections. Of the survey respondents 17 – mainly archives and libraries – are currently using Dublin Core (Table 6-3). A few initiatives have now also developed interpretations of Dublin Core specifically for audiovisual documents.

Although many different descriptive models are used by the respondents in the survey, at a basic level they share the same elements for search and retrieval. As is to be expected, the element 'title' is the most frequently used search field. Most catalogues also enable searches for 'maker', 'key words' and 'date'. About one third of all respondents are able to perform full text searches through their catalogues (see Figure 6-1)

127 'A new world of collection management', Australian Government Information Management Office, URL: http://www.agimo.gov.au/publications/2005/04/enhancing_productivity/part3/screensound.

6.5 Legal rights

Most heritage collections of audiovisual documents came into being when the natural assumption was they would be consulted within the walls of the institution, often for research.[128] Copyright regulations were not usually considered an impediment for such use and consequently for most institutions there was little need to concern themselves with rights. Other materials, such as recordings made in fieldwork for research projects, were never meant to be published, and not much thought was given to the rights invested in oral history documents, stories or songs collected on tape. Now that the digital world has arrived and collections are expected to become accessible on the web, copyright complicates a rapid transition to the online environment.

Some respondents in the survey indicate that even copying materials – without making them accessible on the web – in their country constitutes an infringement of rights, although copying from obsolete carriers is a necessity for preservation of content. A report on copyright issues commissioned by the EU[129] points to the complications in this area even when a country has adopted legislation to allow copying for preservation purposes. The report also recognizes that 'audiovisual works entail the need for clearances by vast numbers of rightholders, including holders of related rights. Also issues of privacy and of right of publicity may frequently arise' (p.4). Out-of-print and 'orphan works' – works of which the right holders cannot be traced or no longer exist – are considered most urgent copyright issues.

An extensive US study shows that 25% of the labels of older commercial audio recordings were untraceable while of another substantial share the status was not entirely clear.[130] This complicates reissue of older recordings by others than the rights holders; on a limited scale this is done by a network of companies, associations and individuals 'in spite of laws that force them underground or overseas' (p.14). But as the report concludes:

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128 This is obviously different for broadcasters, who built archives with a view to re-use and sales, and therefore had to make sure rights would not be an obstacle. If they did not hold the rights themselves – which would have been the case for their own productions – they would have procedures in place to deal with rights of third parties.

129 European Commission, 'Report on Digital Preservation, Orphan Works, and Out-of-Print Works. Selected Implementation Issues,' April 2007. URL: http://ec.europa.eu/information_society/newsroom/cf/itemlongdetail.cfm?item_id=3366

130 Tim Brooks, *Survey of Reissues of US Recordings*, August 2005. Council on Library and Information Resources, Washington. URL: http://www.clir.org/pubs/abstract/pub133abst.html. The situation in the US is particularly worrying as federal copyright law was introduced that protects copyright of pre-1972 recordings till 2067. This means that very few recordings of America's musical heritage of the past 110 years are in the public domain. Protecting copyright was regarded as an incentive for reissue of old recordings, but the report shows rightsholders have done so for only 10% of pre-WWII materials and for hardly anything from before 1920 (p. 13).

Table 6-4 Access complicated by legal rights

	all respondents		respondents that (are planning to) digitize	
	no.	%	no.	%
a lot	57	17	42	19
in some cases	150	44	110	51
not really	134	39	64	30
	341	100	216	100

> 'most pre-1965 recordings…are accessible only to those who visit the institutions that archive historical recordings or to individuals with access to private collections. Today, pre-1965 recordings usually can be found only in large research libraries. Smaller institutions that still hold pre-1965 recordings rarely have the playback equipment needed to provide access to the recordings' (pp. v-vi)

Obviously, digitization would constitute reissue of original content, but heritage institutions who wish to make collections available online do not have the option to go underground or overseas: they will either have to trace the rightsholders and pay the fees, or face potential legal consequences.

Of the respondents in the survey, 60% say that legal rights complicate access to their collections in some cases, or a lot. The remaining 40% do not really come across legal obstructions when opening up their collections. Some of these are broadcasters or companies that hold the rights to their own productions, others are audiovisual departments of government organizations or educational establishments whose collections only include recordings they made themselves.

Dealing with rights is one of the most notorious pitfalls in digitization projects, and generally it is recommended to clear any legal rights before starting to digitize.[131] Some respondents specifically comment that copyright clearance is a main obstacle for them in the digitization process. One respondent underlines that to avoid complications, only materials are digitized of which they own the copyrights. From the figures it appears that problems with copyright become more pronounced among institutions that have embarked on digitization projects or are planning to do so: if we focus on these respondents, the percentage of those who say they are not hindered by copyright restrictions drops to 30% (Table 6-4).

Although in recent years copyright legislation in Europe has been tightened in response to concerns from the industry about extensive copying and sharing of media files on the web, and although EU documents on audiovisual media

131 TASI, URL: http://www.tasi.ac.uk/advice/managing/copyrights.html

in general pay more attention to protection of rights of producers than to removing barriers for public access, some believe the tide towards a more open environment cannot be stemmed. Perhaps some optimism is in order: even the PrestoSpace project, representing some of the largest broadcasters in Europe, believes that change will surely come:

> The main issue is providing access outside the walls of your collections. Most audiovisual collections have never provided such access, and many have words in their charter or other foundation documents, assuming that people will come to their institution for access – possibly even only for 'research access'. Copyright compliance may be seen to require this attendance. As with pre-booking material, in an online world it will be increasingly hard to defend these policies and restrictions. They will be challenged. With the technical barrier removed, copyright law in general – and the wording of institutional charters in particular – will come under heavy attack. The barriers will certainly be shifted, if not dismantled.[132]

132 PrestoSpace, P*reservation Guide* – Develop a Strategy. URL: http://wiki.prestospace.org/pmwiki.php?n=Main.DevelopAStrategy

Appendix A: Calculating amounts of material

Respondents could give estimates of collection size/amount of material in cans, metres, titles, item and hours. All these data were finally converted to hours.

In order to do so, we first checked for each respondent estimates per type of carrier/format in their collections (questions C, D and E). If no data were given here, we used the general estimates in B. This method enabled us to apply different conversion factors to different carriers -instead of one general factor to, for instance, all audio titles.

Conversion factors

Film

	can	metre	title
35mm	0.1822222 hours	0.000605 hours	0.5 hours
16 mm	0.4555555 hours	0.001516 hour	0.5 hours
8 mm	1.2150 hour	0.004048 hours	0.5 hours
other/unspecified	0.6175 hours	0.002056 hours	0.5 hours

Audio

	item	title
cylinders	0.0333333 hours	0.01666666
coarse groove replicated discs (78s)	0.0999999	0.0499999
instantaneous disks	0.0999999 hours	0.0499999
microgroove disks	0.5 hours	0.1 hours
open reel magnetic tape	1 hours	0.33 hours
compact cassettes	1.25 hours	0.25 hours
R-DAT	1.5 hours	0.3 hours
replicated CDs/DVDs	1 hours	0.2 hours
recordable/rewritable CDs, DVDs	1 hours	0.2 hours
minidisks	1 hours	0.2 hours
other/unspecified	0.33 hours	0.11 hour

Video

	item	title
VHS	3 hrs	1 hrs
S-VHS	2 hrs	0.666666666667 hours
U-matic	0.75 hrs	0.25 hrs
Betacam SP	1 hrs	0.333333333333 hours
Betacam Digital	1 hrs	0.333333333333 hours
Video 8	1.5 hrs	0.5 hrs
DV Digital 8	1 hrs	0.333333333333 hours
other/unspecified	1.5 hrs	0.5 hrs

Survey factsheet

This factsheet presents a summary of all questions of the TAPE questionnaire and of the responses as results of database calculations. There are some minor differences with figures presented in the text, as we in a few cases manually corrected answers (often after checking with the respondent by email) or filtered out contradictory results (for instance, if respondents indicated they had '0' of a particular carrier the database sometimes counted them with the group that *does* have this material). In the text we also combined data from two questions in ways that cannot be reconstructed from the data for individual questions.

Contents

A. Survey population
B. Audiovisual collections – general
C. Film collections
D. Audio collections
E. Video collections
F. Preservation
G. Digitization
H. Access

A. Survey population

1. Sector

	no of responses	%
Archive	143	38,24
Library	81	21,66
Museum	42	11,23
Research institute	28	7,49
Institute	26	6,95
Broadcaster	21	5,61
Other	14	3,74
Commercial company	10	2,67
Private collector	9	2,41
Total	374	100

2. Geographical location

	no of responses	%
Poland	63	16,84
Germany	59	15,78
Finland	46	12,30
Italy	34	9,09
Spain	23	6,15
France	23	6,15
United Kingdom	19	5,08
The Netherlands	17	4,55
Russian Federation	14	3,74
Austria	9	2,41
Sweden	6	1,60
Hungary	5	1,34
Denmark	4	1,07
Ireland	4	1,07
Lithuania	4	1,07
Slovak Republic	4	1,07
Norway	4	1,07
Switzerland	4	1,07
Belgium	3	0,80
Czech Republic	3	0,80
Estonia	3	0,80
Serbia and Montenegro	3	0,80
Romania	3	0,80
Slovenia	3	0,80
Latvia	2	0,53
Iceland	2	0,53
Cyprus	2	0,53
Croatia	2	0,53
Greece	1	0,27
Malta	1	0,27
Republic of Macedonia	1	0,27
Albania	1	0,27
Portugal	1	0,27
Turkey	1	0,27
Total	374	100

Is your organization member of a national or international (audiovisual) archives/library/museum organization?
No 172 (48,18 %)
Yes 185 (51,82 %)

Does your organization have a specific (legal) responsibility for collecting and keeping AV materials?
No 169 (48,42 %)
Yes 180 (51,58 %)

Do you manage and keep all materials in your audiovisual collections yourself?
Ourselves 287 (80,62 %)
By other institutions 69 (19,38 %)

Do you have staff that has been professionally trained for working with audiovisual collections?
No 217 (60,96 %)
Yes 139 (39,04 %)

What are the possibilities to be trained for working with audiovisual collections in your country?
Serious lack 119 (38,26 %)
Some, but more training needed 129 (41,48 %)
Sufficient opportunities 63 (20,26 %)

3. Target audiences

	1 (not important)	2	3	4	5 (very important)	total no. of responses	average importance
General public	61	45	75	54	91	326	3,21
Academic researchers	28	43	43	64	158	336	3,84
Students	34	35	48	92	128	337	3,73
Publishing/media	55	65	73	68	48	309	2,96
Other commercial users	41	12	20	18	13	104	2,52
Special usergroup	15	5	25	27	57	129	3,82

B. Audiovisual collections – general

1. Collection size and number of respondents by AV-medium

	no. of responses	no. of responses with known quantity	no. of responses with unknown quantity	quantified hrs
Film	219	152	67	893,629
Audio	326	288	38	9,386,284
Video	312	277	35	10,558,577
Total				20,838,490

2. Expected annual growth rate

	no. of respondents expecting an increase of their collection	expected growth estimated in hrs	current total in %	respon-dents
Film	113	10,468	1,17	51
Audio	246	474,159	5,05	69
Video	256	528,601	5,01	83
Total		1,013,228	4,86	

3. Collection size in amount of hours and number of responses

	<50	>=50 <500	>=500+ <1000	>=1000 <5000	>=5000 <50,000	>=50,000	total hrs
Film	57 (831 hrs)	40 (7,632 hrs)	17 (11,938 hrs)	20 (45,479 hrs)	13 (252,841 hrs)	5 (574,908 hrs)	893,629
Audio	44 (898 hrs)	63 (12,294 hrs)	25 (16,959 hrs)	56 (151,537 hrs)	78 (1,351,516 hrs)	22 (7,853,080 hrs)	9,386,284
Video	31 (631 hrs)	88 (20,022 hrs)	34 (24,778 hrs)	63 (161,915 hrs)	47 (507,635 hrs)	14 (9,843,596 hrs)	10,558,577
	132 (2360 hrs)	191 (39,948 hrs)	76 (53,675 hrs)	139 (358,931 hrs)	138 (2,111,992 hrs)	41 (18,271,584)	20,838,490

C. Film collections

1. Divided by format

	no. of responses	hrs[1]	% of total	unknown quantity
35 mm	78	272.563,09	36,73	10
16 mm	103	428.928,83	57,80	9
8 mm	62	8.868,16	1,20	30
other	32	31.670,00	4,27	7

1 For calculations, see Appendix

2. Condition

35 mm	no. of responses	% of total
(very) good	18	14,40
acceptable	74	59,20
deteriorating	8	6,40
not known	25	20,00
Total	125	100

8 mm	no. of responses	% of total
(very) good	1	11,96
acceptable	52	56,52
deteriorating	7	7,61
not known	22	23,91
Total	92	100

16 mm	no. of responses	% of total
(very) good	16	11,59
acceptable	83	60,14
deteriorating	13	9,42
not known	26	18,84
Total	138	100

other	no. of responses	% of total
(very) good	7	26,92
acceptable	4	15,38
deteriorating	4	15,38
not known	11	42,31
Total	26	100

3. Specific problems in film collections

Nitrate	no. of responses	% of total
high priority	18	50,00
low priority	5	13,89
moderate priority	6	16,67
not known	5	13,89
not present	2	5,56
Total		100

Mechanical damage	no. of responses	% of total
high priority	17	13,08
low priority	27	20,77
moderate priority	51	39,23
not known	27	20,77
not present	8	6,15
Total		100

Vinegar syndrome	no. of responses	% of total
high priority	25	21,37
low priority	22	18,80
moderate priority	21	17,95
not known	39	33,33
not present	10	8,55
Total		100

Fading	no. of responses	% of total
high priority	10	8,13
low priority	19	15,45
moderate priority	43	34,96
not known	44	35,77
not present	7	5,69
Total		100

Storage	no. of responses	% of total
high priority	35	25,55
low priority	24	17,52
moderate priority	41	29,93
not known	19	13,87
not present	18	13,14
Total		100

Cataloguing	no. of responses	% of total
high priority	50	36,23
low priority	29	21,01
moderate priority	32	23,19
not known	14	10,14
not present	13	9,42
Total		100

Other	no. of responses	% of total
high priority	10	34,48
low priority	1	3,45
moderate priority	3	10,34
not known	14	48,28
not present	1	3,45
Total		100

D. Audio collections

1. Divided by format

	no. of responses	hrs	% of total	unknown quantity
Cylinders	43	1.553,28	0.02	31
Coarse groove replicated disks ('78s','shellacs')	84	93.382,64	1	27
Instantaneous disks of any kind	37	223.88,39	0,24	33
Microgroove disks (LPs)	131	9.782.65,10	10,45	35
Open reel magnetic tape	174	5.502.398,39	58,80	38
Compact cassettes	91	1.183.335,75	12,65	55
R-DAT	72	217.233,10	2,32	37
Replicated CDs, DVDs	134	922.765,20	9,86	50
Recordable and rewritable CDs, DVDs	95	395898,20	4,23	49
MiniDiscs	49	28.634,40	0,31	37
Other	30	12.109,68	0,13	24
Total		9.357.964	100	

2.Condition

Cylinders	no. of responses	% of total
(very) good	6	9,52
acceptable	24	38,10
deteriorating	7	11,11
not known	26	41,27
Total	63	100

Coarse groove replicated disks ('78s','shellacs')	no. of responses	% of total
(very) good	14	14,00
acceptable	53	53,00
deteriorating	17	17,00
not known	16	16,00
Total	100	100

Instantaneous disks of any kind	no. of responses	% of total
(very) good	6	9,68
acceptable	24	38,71
deteriorating	17	27,42
not known	15	24,19
Total	62	100

Microgroove disks (LPs)	no. of responses	% of total
(very) good	41	50,62
acceptable	11	13,58
deteriorating	14	17,28
not known	15	18,52
Total	81	100

Open reel magnetic tape	no. of responses	% of total
(very) good	24	12,00
acceptable	100	50,00
deteriorating	46	23,00
not known	30	15,00
Total	200	100

Compact cassettes	no. of responses	% of total
(very) good	53	23,25
acceptable	107	46,93
deteriorating	41	17,98
not known	27	11,84
Total	228	100

R-DAT	no. of responses	% of total
(very) good	40	44,44
acceptable	28	31,11
deteriorating	6	6,67
not known	16	17,78
Total	90	100

Replicated CDs, DVDs	no. of responses	% of total
(very) good	94	58,02
acceptable	52	32,10
deteriorating	3	1,85
not known	13	8,02
Total	162	100

Recordable and rewritable CDs, DVDs	no. of responses	% of total
(very) good	81	59,12
acceptable	36	26,28
deteriorating	6	4,38
not known	14	10,22
Total	137	100

MiniDiscs	no. of responses	% of total
(very) good	33	45,83
acceptable	22	30,56
deteriorating	1	1,39
not known	16	22,22
Total	72	100

Other	no. of responses	% of total
(very) good	9	25,71
acceptable	11	31,43
deteriorating	4	11,43
not known	11	31,43
Total	35	100

Can you estimate how much of the audio collections are original recordings made by/for your own organization?

	no. of responses	average %
yes	249	41,22

For such recordings, do you have information on the equipment used for the recordings and if so, for what percentage?

	no. of responses	% of total	average %
no	111	48,05 %	
yes	120	51,95 %	74,14

3. Specific problems in audio collections

Mechanical damage	no. of responses	% of total
high priority	135	14,83
low priority	81	34,32
moderate priority	70	29,66
not known	33	13,98
not present	17	7,20
Total	236	100

Lack of playback equipment	no. of responses	% of total
high priority	67	27,92
low priority	39	16,25
moderate priority	73	30,42
not known	10	4,17
not present	51	21,25
Total	240	100

Storage	no. of responses	% of total
high priority	56	22,22
low priority	61	24,21
moderate priority	73	28,97
not known	7	2,78
not present	55	21,83
Total	252	100

Cataloguing	no. of responses	% of total
high priority	76	30,04
low priority	43	17,00
moderate priority	81	32,02
not known	7	2,77
not present	46	18,18
Total	253	100

Other	no. of responses	% of total
high priority	13	37,14
low priority	1	2,86
moderate priority	7	20,00
not known	9	25,71
not present	5	14,29
Total	35	100

E. Video collections

1. Divided by format

	responses	hrs	% of total	unknown quantity
VHS	231	6.007.194,00	67,70	41
S-VHS	45	5.711,00	0,06	40
U-matic	82	102.050,75	1,15	32
Betacam SP	96	1.473.176,00	16,60	28
Betacam Digital	47	531.972,33	6,00	31
Video8/VideoHi8	27	6.176,50	0,07	31
DV/Digital8	66	167.560,00	1,89	40
Other	78	579.640,50	6,53	16
Total		8.873.481,08	100	

Can you indicate how much of the video collections are recordings of TV programmes etc?

	no. of responses	average %	hrs
Yes	198	28,84	5,009,896

2 Condition

VHS	no. of responses	% of total
(very) good	53	20,46
acceptable	157	60,62
deteriorating	29	11,20
not known	20	7,72
Total	259	100

S-VHS	no. of responses	% of total
(very) good	10	14,08
acceptable	37	52,11
deteriorating	9	12,68
not known	15	21,13
Total	71	100

U-matic	no. of responses	% of total
(very) good	12	11,21
acceptable	37	34,58
deteriorating	29	27,10
not known	29	27,10
Total	107	100

Betacam SP	no. of responses	% of total
(very) good	40	37,04
acceptable	40	37,04
deteriorating	6	5,56
not known	22	20,37
Total	108	100

Betacam Digital	no. of responses	% of total
(very) good	35	52,24
acceptable	14	20,90
deteriorating	3	4,48
not known	15	22,39
Total	67	100

Video8/VideoHi8	no. of responses	% of total
(very) good	9	18,00
acceptable	19	38,00
deteriorating	5	10,00
not known	17	34,00
Total	50	100

DV/Digital8	no. of responses	% of total
(very) good	52	57,14
acceptable	20	21,98
not known	19	20,88
Total	91	100

Other	no. of responses	% of total
(very) good	32	40,00
acceptable	19	23,75
deteriorating	11	13,75
not known	18	22,5
Total	80	100

F. Preservation

Do you store your audiovisual collections under climate-controlled conditions?
no 167 (46,65 %)
yes 191 (53,35 %)

Do you have a preservation programme for audiovisual collections?
no 233 (66,76 %)
yes 116 (33,24 %)

For analogue materials, do you make separate master copies as well as user/ access copies?

	Film	%	Audio	%	Video	%
always	39	21,55	55	19,64	36	13,53
not applicable	16	8,84	5	1,79	4	1,50
only on request	14	7,73	47	16,79	37	13,91
sometimes, in special projects	30	16,57	63	22,50	58	21,80
very seldom or not at all	82	45,30	110	39,29	131	49,25
Total	181	100	280	100	266	100

When analogue originals deteriorate, do you transfer materials to new carriers?

	Film		Audio		Video	
if uesers wat to consult them	17	9,77	33	18,75	30	11,76
not applicable	16	9,20	5	2,84	4	1,57
special project	30	17,24	58	32,95	55	21,57
systematic programme	42	24,14	62	35,23	43	16,86
very seldom or not at all	69	39,66	18	10,23	123	48,24
Total	174	100	176	100	255	100

Do you outsource work to commercial vendors and if so, what type of work?

	no. of responses	%
No	208	62,65
Conservation work	30	9,04
Transfer to new carriers	82	24,70
Cleaning and repackaging	18	5,42
Digitization	81	24,40

Is there regular maintenance of playback equipment for audiovisual materials?
no 174 (51,94 %)
yes 161 (48,06 %)

Is access to your audiovisual collections complicated by legal rights issues?
a lot 57 (16,72 %)
in some cases 150 (43,99 %)
not really 134 (39,30 %)

G. Digitization

Do you digitize AV materials or are you planning to start digitizing within the next year?

	no. of responses	% of format population
Film	93	43
Audio	166	51
Video	134	43

How would you characterize your digitization activities?

	no. of responses	%
occasionally	61	28,11
special project	97	44,70
systematic programme	59	27,19

What are the main reasons for digitizing materials?
Please indicate importance by a number from 1 to 5 (1= not very important or not relevant, 5 extremely important)

	Film no. of resp.	average urgency	Audio no. of resp.	average urgency	Video no. of resp.	average urgency	Totals no. of resp.	average urgency
To create copies for browsing on site or online	76	3,21	134	3,19	101	2,88	311	3,10
To provide copies at the request of users	82	3,55	146	3,52	105	3,20	333	3,43
To relieve stress on fragile originals which need to be preserved	87	4,18	153	4,22	108	3,90	348	4,11
To rescue content from original (obsolete) carriers that cannot be saved or consulted (for lack of equipment)	84	4,29	151	4,25	112	3,97	347	4,17
Other	8	3,75	9	2,89	11	3,82	28	3,50

What are the preferred formats and resolutions that you use (e.g. WAV,MPEG1, MPEG2, AVI, WMP, ASF, MPEG4,MP3, AAC,.....)?

1.a Film master copies

	no. of responses
Digital Betacam	14
MPEG2	13
AVI	3

1.b Film access copies

	no. of responses
MPEG2	15
MPEG1	5
DVD	5

2.a Audio master copies

	no. of responses
WAV	88
mp3	15
audio CD	5

2.b Audio access copies

	no. of responses
mp3	46
WAV	42
audio CD	10

3.a Video master copies

	no. of responses
MPEG2	28
Digital Betacam	11
AVI	10

3.b Video access copies

	no. of responses
MPEG2	27
DVD	8
MPEG1	6

Which part of the digitization process is done in house?

	no. of responses
Selection and preparation	188
Processing of files to make access copies	126
Storage	171
Providing copies on request	137
Conversion from analogue to digital	134
Cataloguing and metadata	180
Providing access through web interface	65
Migration and digital preservation	92

Do you produce uncompressed and uncorrected archival masters?

	yes	no	total
Film	28	51	79
Audio	94	45	139
Video	44	67	111
	166	163	329

How do you store digital materials?

	masters	HQ copies	access copies
Computer tape	35	14	9
Hard disks	38	30	35
CD-R	69	56	76
DVD	59	45	54
Digital mass storage system	34	21	18
Other	23	12	7

How can the digital collections be accessed?

	Film	Audio	Video
Internal workstation/network on site	33	69	52
Low-quality copies for browsing on web	14	15	9
Streaming on web	15	17	12
Complete files can be downloaded from web	6	5	4
Copies are made on request	44	95	62
As part of products that we sell (CDs,DVDs)	18	31	16
Through third parties that distribute them	5	9	2

Do you keep all the analogue originals after digitization?

	yes	no	total
Film	83	6	89
Audio	149	7	156
Video	110	8	118
	342	21	363

H. Access

What percentage of the audiovisual collections has been described or catalogued?

	no. of responses	estimated amount (hrs)
paper-based catalogue	195	3,924,477
electronic system	250	12,587,576
not described or catalogued	144	2,391,233

How can your catalogue be consulted?

	no. of responses
On site	269
Through internet	124
Other	67

Which searches are possible at the present level of description/cataloguing?

	no. of responses
Titles	294
Maker	213
Key words	197
Date	182
Full text	116

Which (international) standard or guidelines are used for cataloguing/ description/metadata?

	no. of responses
Other	82
ISBD (NBM)	48
MARC 21	25
Dublin Core	17
FIAF cataloguing rules	16
IASA cataloguing rules	11
ISAD(G)	5
METS	2

In digitization, how much time do you spend on updating or complementing metadata?

	no. of responses
We spend a lot of our time on optimizing descriptive metadata	40
Only the most serious problems are addressed, to limit the time spent	50
The descriptions are mostly okay so we do not need to do a lot of work on them	55
The descriptions are not adequate, but we have no resources to improve them	25
Not applicable (no digitization is done)	149
Other	20

Selected websites

International professional organizations

ACE
http://www.ace-film.de/
Association des Cinémathèques Européennes

AEI
http://www.aeinedits.org
Association Européenne Inédits

AMIA
http://www.amianet.org/
The Association of Moving Image Archivists

ARSC
http://www.arsc-audio.org
Association for Recorded Sound Collections

CCAAA
http://www.ccaaa.org
Co-ordinating Council of Audiovisual Archives Associations

EMF
http://www.e-multimedia.org/
European Multimedia Forum

FIAF
http://www.fiafnet.org
International Federation of Film Archives

FIAT
http://www.fiatifta.org
International Federation of Television Archives

FOCAL
http://www.focalint.org
Federation of Commercial Audiovisual Libraries

IAML
http://www.iaml.info
International Association of Music Libraries, Archives and Documentation Centres

IASA
http://www.iasa-web.org
International Association of Sound and Audiovisual Archives

ICA
http://www.ica.org/
International Council on Archives

ICOM
http://icom.museum/
International Council of Museums

ICTM
http://www.ictmusic.org
International Council for Traditional Music

IFLA
http://www.ifla.org
International Federation of Library Associations and Institutions
http://www.ifla.org/VII/s35/index.htm
IFLA: Audiovisual and Multimedia Section (AVMS)

OHS
http://www.ohs.org.uk
Oral History Society

UNICA
http://www.fgdca.lu/unica/
Union Internationale du Cinéma et de la Vidéo Non Professionels

VANEASA
http://www.iwf.de/easa/easa.html
European Association of Social Anthropologists, Visual Anthropology Network

Projects

AMICITIA
Website no longer active [http://www.amicitia-project.de/]
Asset Management Integration of Cultural heritage In The Interexchange between Archives

BIRTH
http://www.birth-of-tv.org/
Building an Interactive Research and delivery network for Television Heritage

ECHO
http://pc-erato2.iei.pi.cnr.it/echo/
European Chronicles On Line

FIRST
Website no longer active [http://www.film-first.org/]
Film restoration & conservation strategies

MIDAS
http://www.midas-film.org/
Moving Image Database for Access and Re-use of European film collections

TAPE
http://www.tape-online.net
Training for Audiovisual Preservation in Europe

PrestoSpace
http://www.prestospace.org
Preservation towards storage and access. Standardised Practices for Audiovisual Contents in Europe
http://prestospace-sam.ssl.co.uk/
PrestoSpace: A/V Archive Digitisation & Storage Guide

PRESTO
http://presto.joanneum.ac.at/index.html
Preservation Technology for European Broadcast Archives

Other

British Sound Archive
http://www.bl.uk/collections/sound-archive/nsa.html
The British Library Sound Archive

BUFVC
http://www.bufvc.ac.uk/
British Universities Film & Video Council

European Audiovisual Observatory
http://www.obs.coe.int/
European Audiovisual Observatory

LOC
http://www.digitalpreservation.gov/formats/index.shtml
Digital Formats Web site of the Library of Congress

LOC
http://www.loc.gov/avconservation/
Audio-Visual Conservation at the Library of Congress

MEDIA
http://ec.europa.eu/information_society/media/index_en.htm
EU support programme for the European audiovisual industry

MEMORIAV
http://www.memoriav.ch
MEMORIAV, Association for the preservation of the audiovisual heritage of Switzerland

MIC
http://mic.loc.gov/preservationists_portal/presv_index.htm
Preservation Portal of the MIC (Moving Image Collections) website

NFSA
http://www.nfsa.afc.gov.au/
National Film & Sound Archive Australia

Phonogrammarchiv
http://www.pha.oeaw.ac.at/
Phonogrammarchiv Austrian Academy of Science

Silent Era
http://www.silentera.com/
Silent Era

UNESCO
http://www.unesco.org
United Nations Educational, Scientific and Cultural Organization (UNESCO)
http://portal.unesco.org/ci/en/ev.php-URL_ID=1988&URL_DO=DO_TOPIC&URL_SECTION=201.html
UNESCO site for Audiovisual archives

Select bibliography

This bibliography presents a selection of practical guidelines, reports, handbooks, websites and technical documents that have been consulted for the preparation of this report and will be of use to managers of audiovisual collections. More documents can be found by consulting the database of literature on the TAPE website URL: http://www.tape-online.net/literature.cfm

Adelstein, Peter Z., *IPI Media Storage Quick Reference*, Image Permanence Institute, 2004. URL: http://www.imagepermanenceinstitute.org/shtml_sub/msqr.pdf
A concise and very informative leaflet on storage and relation to media life. One of the IPI publications on the IPI Media Storage website.

AMIA, 'Videotape preservation fact sheets', Association of Moving Image Archivists (AMIA). URL: http://www.amianet.org/resources/guides/fact_sheets.pdf?
17 fact sheets about all aspects of video tape preservation: history and composition, formats, reformatting, cleaning, common problems, handling, storage, disaster preparedness. With do's and don'ts and bibliography.

Baaten, Liesbeth and Matthias Vandermaesen, *Digitaal Geluidsarchief. Krachtlijnen digitalisering : standaarden, formaten en dragers* ('Digital sound archive. Principles of digitization: standards, formats and carriers'), Stadsarchief Antwerpen, 2004.
URL: http://www.edavid.be/cdavid/cdavid/Rapporten.html
Well-written, clear overview for digitizing audio, with easy-to-understand descriptions of carriers and standards and recommendations for their use in an archival context (in Dutch).

Biltereyst, Daniël, and Roel Vande Winkel *Bewegend Geheugen: een gids naar audiovisuele bronnen over Vlaanderen* ('Moving memory; a guide to audiovisual resources of Flanders'), Academia Press, 2004.

Boston, George (IASA), *Survey of Endangered Audiovisual Carriers*, UNESCO, 2003. URL: http://portal.unesco.org/ci/en/ev.php-URL_ID=13437&URL_DO=DO_TOPIC&URL_SECTION=201.html
Presents results of a survey for 32 different types of carrier and where applicable provides a comparison with a previous survey (in 1995).

Bradley, Kevin, *Risks Associated with the Use of Recordable CDs and DVDs as Reliable Storage Media in Archival Collections*, Memory of the World Subcommittee on Technology, 2006. URL: http://unesdoc.unesco.org/images/0014/001477/147782E.pdf

Brooks, Tim, *Survey of Reissues of US Recordings*, Council on Library and Information Resources, 2005. URL: http://www.clir.org/pubs/abstract/pub133abst.html
The survey was designed to quantify the degree to which rights holders of historical sound recordings have made available, either directly or through licensees, past recordings that they control.

BUFVC [British Universities Film & Video Council], *The Researcher's Guide: Film, Television, Radio and Related Documentation Collections in the UK*, BUFVC, 2001
Sixth expanded printed edition, listing 547 collections, describing 118 core radio collections, 319 core moving image collections and 110 core documentation collections. Each entry gives a comprehensive description of the collection and full contact details, access

information, viewing facilities, copyright status of material held, catalogue systems, documentation, and other relevant details. The publication is enhanced by articles and appendices relevant to film and television research.

Byers, F.R., *Care and Handling of CDs and DVDs: a guide for librarians and archivists*, CLIR report; 121, Council on Library and Information Resources /National Institute of Standards and Technology
2003. URL: http://www.clir.org/pubs/reports/pub121/pub121.pdf
A very informative, complete overview of resources from the industry's accumulated knowledge base and NIST studies on optical disks (CD-ROM, CD-R, CD-RW, DVD-ROM, DVD-RAM, DVD-R, DVD-RW, DVD+R, and DVD+RW). Presents technical explanations and guidelines that will maximize the lifetime and usefulness of optical discs. Includes a glossary, a handy quick reference guide, and many boxed summaries and guidelines for easy reference.

Casey, Mike, and Bruce Gordon, *Sound Directions. Best practices for audio preservation*, Indiana University/Harvard University, 2007. URL: http://www.dlib.indiana.edu/projects/sounddirections/bestpractices2007/

CCAAA (Coordinating Council of Audiovisual Archives Associations) 'CCAAA strategic framework for professional training and development – a working paper', revised version, 2006. URL: http://www.ccaaa.org/papers.shtml.

CDP Digital Audio Working Group, *Digital Audio Best Practices, Version 2.1,* Colorado Digitization Program, 2006. URL:www.cdpheritage.org/digital/audio/documents/cdp_dabpv2_1.pdf
Provides guidelines for technical issues and a set of best practices for Colorado cultural heritage institutions interested in converting analogue cassette tape recordings of oral histories into digital format. Recording new oral histories directly into digital format is also addressed. Includes a matrix of steps with examples and decisions.

Cook, Pam, and Mieke Bernink (eds), *The Cinema Book,* 2nd ed, BFI publishing, 1999.

Council on Library and Information Resources, *Capturing Analog Sound for Digital Preservation: report of a roundtable discussion of best practices for transferring analog discs and tapes,* CLIR report 137, Council on Library and Information Resources /Library of Congress
2006. URL: http://www.clir.org/pubs/reports/pub137/pub137.pdf
Investigates procedures to reformat sound on analogue carriers to digital media or files. It summarizes discussions and recommendations emerging from a meeting of leading audio preservation engineers held January 29-30, 2004, to assess the present state of standards and best practices for capturing sound from analog disks and tapes.

Debuysere, Stoffel, 'Culture intercom redux. Audiovisual media in a network culture.' *Content in Context. New technologies for distribution*, Netherlands Media Art Institute, n.d. (2005).

Digital Preservation Coalition, *The Preservation Management of Digital Material Handbook*, URL: http://www.dpconline.org/graphics/medfor/formats.html

Edmondson, Ray, *Audiovisual Archiving: philosophy and principles,* 2nd revised edition, UNESCO, 2004. Available in English, French and Spanish. URL: http://portal.unesco.org/ci/en/ev.php-URL_ID=15592&URL_DO=DO_TOPIC&URL_SECTION=201.html.
Authoritative discussion of the principles of audiovisual archiving principles, with substantial background information on (the history of) the field, based on years of experience. Thought-provoking and highly recommended to understand what audiovisual archiving is and should be.

Erpanet, 'File Formats for Preservation', final report Erpaseminar, Vienna 10-11 May, 2004. URL: http://www.erpanet.org/events/2004/vienna/Vienna_Report.pdf.

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A thorough introduction into the history and theory of moving image film, video, sound recording and allied technologies. The author explains scientific, technical and engineering concepts, using language that can be understood by non-scientists. A discussion of traditional film-based technologies is integrated with the impact of emerging 'new media' technologies such as digital video, e-cinema and the Internet. Written for students with some technological knowledge studying the humanities who have an interest in becoming better versed in moving image technology.

European Commission, 'Report on Digital Preservation, Orphan Works, and Out-of-Print Works. Selected Implementation Issues,' April 2007. URL: http://ec.europa.eu/information_society/newsroom/cf/itemlongdetail.cfm?item_id=3366

European Commission, 'Scientific information in the digital age: ensuring current and future access for research and innovation', Communication IP/07/190, February 2007. URL: http://ec.europa.eu/research/science-society/document_library/pdf_06/communication-022007_en.pdf.

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Gilmour, Ian, 'Research Report on JPEG 2000 for Video Archiving', 2007, URL: http://www.media-matters.net/whitepapers.html.

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IASA Technical Committee, *Guidelines on the Production and Preservation of Digital Audio Objects*, edited by Kevin Bradley. IASA TC-04, 2004.
The standard text for audio digitization. Provides guidance on a professional approach towards digital audio objects. It addresses the production of digital copies from analogue originals for the purposes of preservation, the transfer of digital originals to storage systems, as well as the recording of original material in digital form intended for long-term archival storage. Divided into three parts: standards, principles and metadata; signal extraction from originals; target formats. Technical but highly recommended.

IFLA Audiovisual and Multimedia Section, *Guidelines for Audiovisual and Multimedia Materials in Libraries and Other Institutions*, IFLA, 2004. Available in 19 languages. URL: http://www.ifla.org/VII/s35/pubs/avm-guidelines04.htm.
Brief document (15 pp) on the place of audiovisual materials in libraries, with basic advice on user services, cataloguing, preservation and digitization, with definitions of the most common terms and web references for major organizations.

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An extensive overview of the condition of Dutch audiovisual collections on the basis of a survey held in 1998 amongst many local, regional and national institutions that hold audiovisual materials.

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National Film and Sound Archive, 'Technical Glossary of Common Audiovisual Terms' URL: http://www.nfsa.afc.gov.au/preservation/audiovisual_terms/
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Texas Commission on the Arts, *Videotape Identification and Assessment Guide*, 2004, URL: http://www.arts.state.tx.us/video/
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'Unlocking Audio', international conference, British Library, 26-27 September 2007.
Presentations at URL: http://www.bl.uk/collections/sound-archive/unlockingaudio.html.
The papers of a number of experts on audio preservation can be seen (PPT) and heard

(complete audio recording of presentations including discussion). Interesting cases of different projects

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