



Deliverable 2.1 User Requirements Final Report PrestoSpace Questionnaire 1

Preservation and Digitisation Plans: Overview and Analysis

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ABSTRACT This report is the summary and analysis of the results of PrestoSpace Questionnaire_1 on user requirements, distributed amongst Broadcast archives, Film archives and Service providers.

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1. Introduction

Project Background

Institutions traditionally responsible for preserving audio-visual collections now face major technical, organisational, resource, and legal challenges in migrating to and preserving current digitised holdings. The major problem confronting archives today is the rather poor condition of, and limited access to, their collections; the problem is compounded by obsolete equipment and a lack of funding to cover preservation goals.

The PrestoSpace consortium proposes that an integrated solution for sustaining audiovisual material and obtaining preservation funding is digitising - the most far-sighted method of preservation, one which provides all the essentials for new and expanded access.

The primary deliverable of the PrestoSpace project is to develop new solutions and to prepare facilities and services for audiovisual digital preservation. These preservation factories services will exploit the technological and industrial results of this project.

The PrestoSpace User Group

To truly capitalise on the opportunities new and innovative technologies will bring forth, PrestoSpace does not rely only on the experiences and ideas of the project partners. A user group was established to ensure that the project's solutions meet as much as possible the demands and needs of potential users. This group consists of various kinds of audiovisual archives and their service providers, and will give input on PrestoSpace tools and services throughout the project.

The user group was established by contacting FIAT and FIAF members by e-mail. In addition, existing individual project partners' mailing lists were used. In cooperation with the Minerva project, smaller heritage institutions were reached. A user group meeting was organised in March 2004 and was attended by seventy delegates.

The PrestoSpace Questionnaire: Purpose of the Survey

A questionnaire was created by the project partners. The objective: to provide an overview of potential users' functional requirements for the PrestoSpace factory tools and services. The goal: to give potential users the chance to critically reflect on assumptions made by the project partners and to confirm that these meet the actual needs of the users and of the market.

Managing a digital environment implies designing and utilising the most suitable workflow concepts and business processes. Thus the questionnaire was divided into four process descriptions and four workflow scenarios related to the different activities, those which reflect the project work breakdown structure.

The questionnaire consisted of six parts:

1. State of the Art
2. Preservation Factory/Subcontracting Services
3. Work Area 1: Preservation Process
4. Work Area 2: Restoration Process
5. Work Area 3: Storage and Archive Management (SAM)
6. Work Area 4: Documentation and Publication Process (MAD)

The results will be used for specifying system functionality in more detail, to give an estimate of the achievable improvements, and to verify that expected developments are worth the effort.

The Survey Participants

In the spring of 2004, the first questionnaire was disseminated, by e-mail, among members of the user group. The recipients were broadcast and other audiovisual archives: curators, technical experts and managers, who are familiar with digitisation projects and are able to provide information about their

own experiences, whatever the size of their collections and the media involved. They were asked to assess and amend the PrestoSpace proposals according to their experiences and needs.

Separate versions of the questionnaire were then sent to service providers, focussing on technical facilities and preservation management, as well as to film archives, focussing on their needs and experiences which generally differ from those of broadcast archives.

In total, twenty-nine organisations from eleven European countries participated: 15 archives returned the broadcast version; five the film archive version and nine service providers returned the service provider version. The majority of respondents were large, national archives; smaller audiovisual archives are underrepresented in the survey results. See appendix 1 for the list of survey participants.

The results of the first PrestoSpace questionnaire are presented in this report.

2. Executive Summary

Preservation Factories and Subcontracting Services

The assumption within PrestoSpace is that migrating contents to digital formats, if properly organised, will be one of the key actions that will simultaneously allow heritage preservation and access to collection content. Although this viewpoint may appear somewhat extreme in some cases, it is considered indispensable, even in cases where physical preservation of original items is also required.

The main deliverable of the PrestoSpace Project is to ensure that facilities are developed and that actual affordable services are launched for audiovisual preservation, enabling migration to digital. The Project will initiate the preservation factories by preparing a business plan, contacting potential investors and working with commercial partners to set up the services. The expectation that the major PrestoSpace consortium members will make use of these services, should be a strong economic factor supporting these preservation factories.

Asked to identify their most common problems, most unexpected problems and future digitisation objectives, responders focussed on three areas: 1) the lack of condition assessment information as well as the rather poor condition of materials; 2) the lack of infrastructure: physical, organisational (workflow) and financial (required budget and expense control); and 3) rights negotiation hampered further by missing and or incorrect original documentation.

Regarding outsourcing, 71% of broadcast archives and all the film archives are willing to outsource part of their collection migration or subcontract part of their planned migration. Reasons why archives choose not to outsource are varied, but include: to save money; to have more control over data file and metadata management; belief they either have the expertise or want to develop it in-house.

The PrestoSpace approach proposes a "cost of quality" concept. This approach would enable archives to plan using cost figures which reflect a balance between quality and total output. (In other words, choosing between the cost of preserving a whole archive at 95% quality or the cost of preserving half the archive at 99% quality).

Sixty-eight percent of broadcast archives find the proposed "cost of quality approach" acceptable and 81% would use price/quality arbitration tools from PrestoSpace when establishing their migration plans. A majority (60 vs 40%) of film archives find the approach acceptable and 40% would use price/quality arbitration tools from PrestoSpace when establishing their migration plans. However, it is important to note that neither are willing to accept material loss during transfers.

When asked how they funded past digitisation projects (including whether or not they employed a formal business case to secure funding), broadcast archives stated that no formal business case was made to secure project funding 67% of the time. Demonstrated difficulty in supplying cost information may indicate that archives are yet not ready to implement a business case approach to preservation migration (where cost to volume ratios are required), a requirement of the proposed PrestoSpace approach. This emphasizes the need to supply archives with the necessary tools to apply a business case model in preservation planning and funding.

The Services

When asked to rate proposed services, those rated as "must have" were:

- bulk preservation/migration
- cleaning/physical repair and
- quality assessment

Only half or less of the Service Providers currently offer two of the three "must have" services (bulk preservation and cleaning/physical repair). Service Providers, however, do express a willingness to offer the services in the future.

Service Providers currently handle all formats identified as in most urgent need of preservation, yet obsolete audio carriers appear to be handled only by a minority. In general, archive and service provider responses regarding audio were minimal.

When service providers were asked what obstacle prevents them from offering new services, (financial, technological, organisational, etc) "financial" was considered the greatest. More specifically, 44% found financial and organisational obstacles decisive; 22% estimated financial and technological obstacles the most important; and 22% identified financial as the sole obstacle. Other reasons included legal and space issues.

Preservation Process

It is clear in responses throughout the survey that film archives do not consider digitisation, in its current development, a "preservation" step, but only a step enabling enhanced access.

Many archives (film and broadcasting) have difficulties quantifying their holdings and needs per carrier type. Some could provide the number of items, but not in related hours; most did not provide shelf lengths, or estimated growth. In addition, many lack useful collection condition information. This could hamper selection procedures and cause difficulties in the factory approach. Archives clearly need help in quantifying their specific carrier holdings and related preservation needs.

The current broadcast archive approach for migration to digital formats, relies on operator control of one or sometimes several (for audio) transfer chains. Spot-checks on start/middle/end/problematic sections are usually performed to complete the process. Automatic quality control is not used for video, and only sometimes for audio. Consensus is found on bar-coding, on the use of batches, and on the lack of appropriate tools for generating and exploiting reported quality control information. Divergence appears on selection (prioritisation) policy. Film remains a problem due to cost and material preparation needs.

Film archives often do not have the same massive digitisation policy as broadcast archives. They digitise less, count much more on the professionalism of telecine operators and spend more time verifying results. Archives are interested in automation, but approach its use with film more cautiously.

Several service providers have already started running multiple transfer chains in video. They often run spot-checks on start/middle/end/problematic sections and express a strong interest in automation and quality control during transfer (even for open reel tapes). They demonstrate flexibility with respect to their customers' requirements. They sometimes deliver to their customers the technical metadata generated during playback, but they do not know how these are used. Doubts persist with respect to possible automation of film digitisation that still requires on-the-fly supervision.

Finally, most broadcast archives require improvements in automation and there is a common requirement for a more industrial approach to the preservation process. Improvements in tape condition assessment tools, robust devices and quality control reporting are expected.

Restoration Process

In general, survey respondents have done little or no restoration work due to time constraints, and offered little detail on how they would proceed. However, survey responses clearly identified unsolved areas of critical defects, providing PrestoSpace with an opportunity to address those needs. Most survey respondents agreed to the proposed restoration workflow. In addition, no new services were requested.

Restoration approaches differ between broadcast and film archives. Broadcast archives consider speed the main factor in video restoration. This should be achieved with a high degree of automation and should occur mostly unsupervised. Workflow integration is important as well as skilled technical staff. Film archives, on the other hand, emphasize high quality results (without introducing any artefacts) and changes only where necessary. For them, high quality work is much more important than a highly streamlined workflow. Service providers identify flexibility and adaptability as the key to providing a service compatible with customer requirements.

Almost all archives express a strong need for defect and quality related information – even when restoration is not performed; it is particularly helpful to have this kind of information when an item is to be re-used. Service Providers confirm this, believing the generation and storage of technical data on what has been done and where, is a crucial element in the restoration process.

There was no overwhelming consensus regarding intermediate and final digital media carrier/formats produced during the restoration phase and no standardisation in technical data generation. The Restoration Work Area must therefore work closely with the other Work Areas in defining data and carrier/format standards to ensure that data and essence are made accessible.

Storage and Archive Management (SAM)

The bulk of archive material remains on shelves, but nearly half of respondents have significant mass storage systems. The actual amount already committed to mass storage is relatively small, indicating that most archives haven't yet made major investments and also signifying the need to supply relevant data on storage technology.

Broadcast archives need information on new technology, especially related to hard drives. They also request information on security and longevity of storage technology, and finally, information on costs and standards. Film archives appear to be under slightly less pressure for urgent collection migration. However they do express a need for PrestoSpace information. Archives were mostly interested in media longevity. Service Providers need information in security, longevity, technology change, efficient migration and cost.

There was a plea for storage technology that could simply and affordably support both professional (edit quality) and heritage (web quality) requirements. This is more access than storage, but they can't be separated. The Storage and Archive Management (SAM) Work Area and the Documentation and Publication Work Area (MAD) need to agree on how to support multiple levels of access. In addition, the Preservation Work Area has to agree on compatible digitisation/encoding.

It is clear that all archives have plans to migrate to digital formats. However there is a clear distinction between digitisation for access only and for preservation purposes. 35mm films, for the most part, will be preserved on film. The majority of digitally migrated film will be to low resolution access formats. On the other hand, the chosen target formats for video and audio are often at higher resolution compatible with archive and re-use requirements. There is no standard in both carrier type or encoding formats although there is some convergence in audio formats.

Altogether, archives are concerned about how to provide quality maintenance of devices and content rather than how to move to mass storage.

Documentation and Publication (MAD)

The vast majority of archives consider the MAD deliverables important to increasing business opportunities.

Given the amount of budget expended on documentation tasks, the archives welcome any tools that can speed up and make the process more efficient. Challenges the PrestoSpace project need to address include the lack of standardisation employed in documentation methodologies and a lack of standardisation in keyword/thesauri use.

Regarding access, the survey clearly demonstrates an urgent need for online browsing of material. Archives consider this a key element in reducing documentation costs and increasing collection accessibility.

Standardised production and delivery of collection related metadata, historical as well as newly generated, is also considered an important component in increasing collection access. Accommodating exchange between the various information systems currently in use will be a big challenge as there is demonstrably little convergence in exchange formats for metadata or essence.

Also important to note is that many organisations want to keep the planning and analysis of information systems under their control. At the same time, only half of the archives have an internal IT department and they are generally quite small.

Conclusions

All broadcast archives and service providers, and 60% of film archives, consider the Preservation Factory approach compatible with their organisation/business orientation. Their enthusiasm for this approach may be explained in its detailed process planning and proposed tools. It is important to note, though, that archives are only willing to outsource part of the migration work. It is also clear that not all archives are currently capable of defining how much time/money/effort is necessary and what steps need to be taken. There is little awareness of how to employ business models, which emphasises the need to provide support tools for archives in this area as business models are an important factor in the proposed PrestoSpace approach.

For broadcast archives, digitisation is the solution to preservation and access problems; film archives consider digitisation more the step to enhanced access. Rights clearance remains a major unsolved issue: archives often need to know what can legally be made accessible before determining what collections should be digitised.

One of the biggest challenges for PrestoSpace is the area of standardisation. There is a clear lack of standardisation in all work processes (collection documentation data, technical data, information systems used to store such data and essence carriers/formats). PrestoSpace has the opportunity to set these standards but this will require close cooperation between all work area partners.

Finally, the results demonstrate that there are topics which need more investigation. How can archives be encouraged to embrace outsourcing on a larger scale? How will the resulting new services be marketed by Service Providers and archives? It may also be interesting to investigate what services larger/national archives perform for smaller archives.

3. Preservation Factories

Overall Objective: Audiovisual Preservation Services

The main deliverable of the PrestoSpace Project is to develop and launch facilities and services for audiovisual preservation, preferably in conjunction with existing service providers where such providers exist, and in the absence of existing service providers by encouraging the establishment of new facilities. These facilities and services, whether provided by existing or new service providers, will exploit the technological and industrial results of the project.

The expectation that the major PrestoSpace consortium members will make use of these services, should be a strong economic factor supporting these preservation factories.

3.1. Preservation Factory – Compatibility and Commitment

All the broadcast archives and Service Providers consider the Preservation Factory approach compatible with their organisation/business orientation. However, only 60% of the film archives do. Perhaps this indicates that film archives are still considering whether the factory approach is viable for them, given that they are more likely to view digitisation as an access tool rather than a preservation methodology.

Off-site Processing and Outsourcing

Only a slight majority (56 vs 44%) of broadcast archives expressed a willingness to digitise their collections off-site. When asked why, various reasons were given including the desire to keep the knowledge in-house, a lack of quality control and a lack in confidence in what service providers can do. Physical issues such as transportation, lack of access to materials stored off-site and collection security are also mentioned. Copyright issues also play a role. 100% of the film archives, on the other hand, said they would allow their holdings to be digitised off-site.

Regarding outsourcing (allowing outside companies to perform digitisation), 71% of broadcast archives were willing to outsource part of their collection migration. All the film archives said they would outsource or subcontract part of their planned migration.

Holdings to be Outsourced	% of Broadcast Archives Willing to Outsource	% of Film Archives Willing to Outsource
0%	29%	0%
0-10%	24%	0%
10-25%	0%	0%
25-50%	12%	0%
50-75%	12%	0%
75-100%	12%	20%
100%	12%	80%

There are different reasons why archives do not want to outsource migration. Some believe it is less expensive to do the work in-house; some feel doing it themselves gives them more control over data file and metadata management, or they have the expertise or want to develop it, in-house.

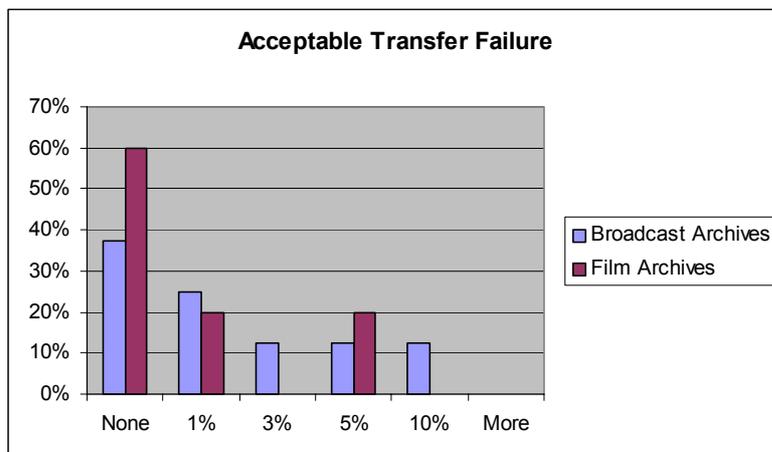
56% of the Service Providers plan to outsource or subcontract some services.

Material Loss during Transfer

Archives were asked about how much transfer failure they are willing to accept and if it was important to know why failures occur.

Both broadcast and film archives are not willing to accept much transfer failure and find it important to know why failure occurs. When asked what failure is acceptable, 82% of the broadcast archives and

100% of the film archives will accept only 5% or less failure. 59% of broadcast archives and 80% of film archives will accept none or 1%.



More than 60% believe knowing the reason for any failure is important in ensuring future corrective action, better planning and future recovery. Most believe that technical problems are probably inevitable but loss in transit or human failure is not acceptable. There is also agreement that for unique material, no loss is acceptable.

The Cost of Quality Approach

The PrestoSpace approach proposes a “cost of quality” concept. This approach would enable archives to plan using cost figures which reflect a balance between quality and total output. (In other words, choosing between the cost of preserving a whole archive at 95% quality or the cost of preserving half the archive at 99% quality).

Archives were asked if this approach was acceptable and if this kind of cost figure, balancing process quality against the total amount of material being preserved, would be useful for the archive (or do they always go for the “highest achievable quality”?)

68% of broadcast archives find the "cost of quality approach" acceptable and 81% would use price/quality arbitration tools from PrestoSpace when establishing their migration plans. For film archives, a slight majority (60 vs 40%) find the "cost of quality" approach acceptable and only 40% would use the price/quality arbitration tools.

3.2. Business Case / Experience with Previous Digitisation Projects

Project Funding

Broadcast archives were asked how they funded past digitisation projects (including whether or not they employed a formal business case to secure funding) and how they justified funding. There was no formal business case made to secure project funding 67% of the time. This emphasizes the need to supply archives with the necessary tools so they can apply business case models to justify their preservation planning and funding.

The majority of archives funded their digitisation project(s) with their annual budget. When asked about how funding was justified, (with “need”, “future benefit” or “future access” as choices), all three were found important, with access dominating.

Project Problems and Future Objectives

Asked to identify their most common problems, and most unexpected problems, responses focussed on three areas: the lack of condition information as well as the poor condition of materials; the lack of infrastructure: physical, organisational (workflow) and financial (expense control and available budget); and rights negotiation hampered further by missing and or incorrect original documentation.

Future digitisation objectives include preservation of material in urgent need (obsolete formats, poor condition and analogue materials as priority), improving public service by increasing accessibility and increasing footage sales.

3.3. The Services

The following rating resulted when archives were asked to prioritise the following proposed subcontracting services: (3=highest score)

Must Have	
2,7	Bulk preservation/migration
2,0	Cleaning/physical repair
2,0	Quality assessment
Nice to Have	
1,6	Difficult items preservation/migration
1,4	Digital restoration (low resolution for access purposes)
1,3	Manual metadata generation/indexing
1,2	Consulting (please specify)
1,1	Media storage
1,0	Inventory
1,0	Digital restoration (high resolution as a tool for film restoration)
0,9	Automatic metadata generation/indexing
0,8	Data storage
0,7	Database management
0,7	Planning
0,4	Shipment
0,3	Commercial

The resulting prioritisation indicates that preservation process related services are the most important to archives.

Service Providers were asked to identify which of the above services they currently offer, as well as those they might possibly offer (if not offered now). It is interesting to note that two of the three “must have” services (bulk preservation and cleaning/physical repair) and the top 5 “nice to have” services are currently offered by only half or less of the service providers. Service Providers however do express a willingness to offer the services in the future.

Services Currently Offered by Service Providers (6 of 9 responding)

No. of SP	Currently Offered
5	Quality assessment
4	Shipment
4	Media storage
3	Consulting (please specify)
3	Cleaning/physical repair
3	Digital restoration
3	Automatic metadata generation/indexing
2	Inventory
2	Bulk preservation
2	Difficult items preservation
2	Manual metadata generation/indexing
2	Data storage
2	Database management
1	Planning
1	Commercial

Service Providers identified a large variety of services currently offered, in the areas of restoration, laboratory services, film and TV production/post production facilities, storage services and conversions. Regarding film services, 6 of 9 service providers handle film materials (an additional one outsources film work). (See appendix 2 for more detailed information on materials handled and services offered by Service Providers)

When asked to provide detail on future services, areas included HD, mass storage and retrieval, digital film initiatives, file interchanges and broadband services with web hosting facilities. Their expected benefits: more customers by adapting more to market demand and lower costs. When asked what obstacle prevents them from offering new services, (financial, technological, organisational, etc) "financial" was considered the biggest. More specifically, 44% found financial and organisational obstacles decisive; 22% found financial and technological obstacles the biggest and 22% identified financial as the sole obstacle. Other reasons included legal and space issues.

4. Work Area 1: Preservation/Digitisation Process

4.1. Background

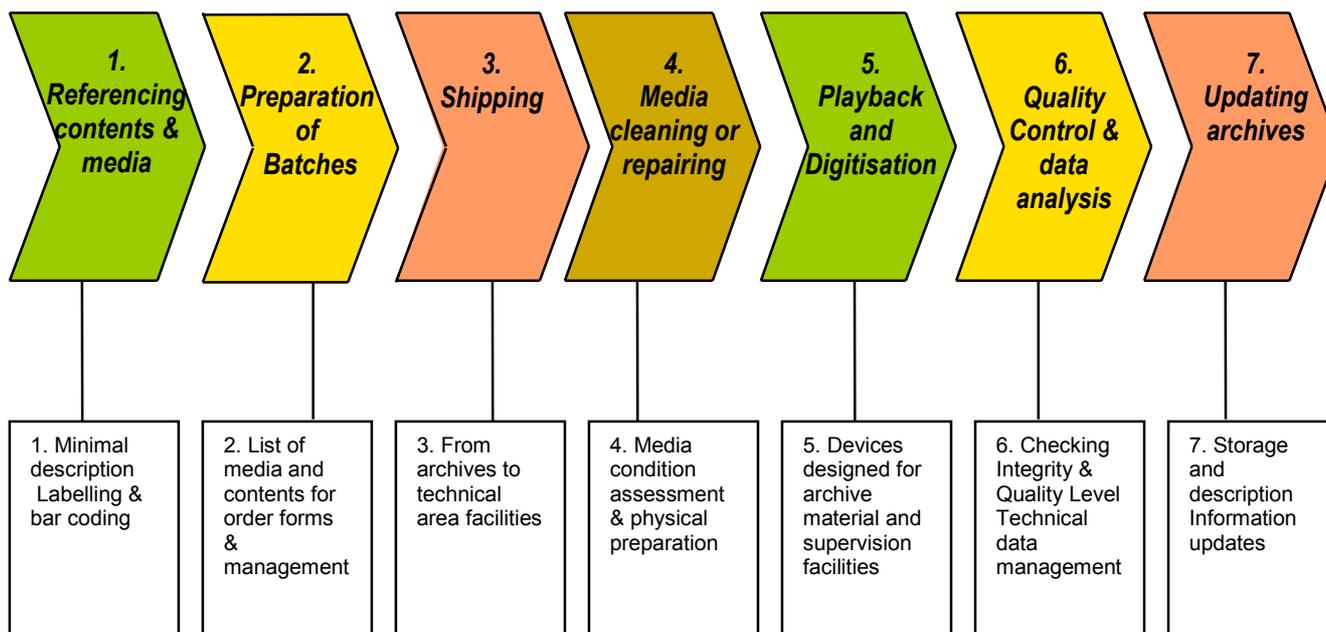
4.1.1. Addressed problem

The objective of the preservation work area is to build and integrate the necessary blocks that will help reduce the cost, and improve the quality and throughput of the preservation effort by audiovisual archives. The general aim: to develop technology working as much as possible unattended, automating where possible time-consuming repetitive tasks, detection and problem correction, leaving the decisions that cannot be automated to skilled operators.

This will be achieved by building the necessary blocks first. A large part of these blocks are playback devices that will offer substantial improvements over currently used tools, by being cheaper, faster and less harmful to the media. Other developments will include tools for assessing the condition of audio and video tapes and exploring how automation can reduce the operator involvement in transferring film, open reel tape and discs.

To help support the preservation effort, an information system will be developed that will allow the management and individual tracking of the preservation record.

Work Area 1: Preservation/Digitisation Process



4.1.2. PrestoSpace Approach

The first step in the technical chain is material selection and gathering information: archive curators choose content to be preserved based on existing inventories. Minimal information per item is required (concerning content and physical nature) which is to be input into a “preservation database”, laying the foundation for a preservation plan. The selection is then prepared in batches, including an estimation of costs and delays based on the minimal information. Batch shipping is organised. In order to prepare for playback, some cleaning and repair is strongly recommended. In addition, item documentation is verified and signal features may be checked by an operator. Before launching the transfer, some initial set-ups may be required. The operator then initiates the transfer. The role of the operator is to make adjustments, track impairments and supervise quality control (during and after the process) and depends on the available tools and pre-defined level requirements. Finally, metadata is updated in archival databases so as to include newly produced technical and content information.

4.2. Survey Results on Current Preservation Needs and Workflow Processes

It is important to note that the film archive version of the survey questioned film archives about their digitisation needs with the understanding that they consider digitisation an access tool and not a preservation tool. In general, film archives preserve film by transferring it to film, not to a digital format, and do not consider the digitisation of holdings a preservation step but a step for enhancing access.

Survey respondents were asked to identify film, video and audio holdings in most urgent need of preservation in order to establish priorities and understand the depth of the problem.

In general, broadcast archives identified 16mm materials (particularly SEP MAG holdings), $\frac{3}{4}$ inch Umatic video formats and $\frac{1}{4}$ inch audio tapes as the carriers in greatest need of preservation. For film archives, 35mm safety and nitrate are identified as the carriers in most urgent need. (See appendix 3 for specific material priority ratings).

Service providers report the capability to handle all of these formats. Of the nine companies participating in the survey:

- 67% provide film services
- 100% provide video services
- 89% provide audio services

- 6 of 9 (66%) provide film, video and audio services
- 2 of 9 (22%) provide only video and audio
- 1 of 9 (11%) provides only video

Not one specialises solely in film or audio.

Current Preservation Workflows

In general most broadcast archives include the following stages in the preservation workflow process (film archives were not specifically asked about the stages):

- selection (sometimes driven by condition information)
- cataloguing data creation and/or verification
- restoration/cleaning
- transfer
- quality check followed sometimes by improvements to digital version
- updating of cataloguing information including technical transfer information.

This workflow agrees with the proposed PrestoSpace approach.

Material Selection and Identification

All broadcast archives agree that minimum identification of material and content is required for the preservation process including: unique material number, type of carrier, duration and title of the programme or short description of the content. Most report the use of simple tools (Excel, Access) when managing preservation processes, but they point out that because the resulting information is difficult to reintegrate into their main databases, information is sometimes lost. There is consensus that labelling AND bar coding are essential for the unique identification of material in the whole preservation chain.

Film curators insist on precise technical descriptions on formats, defects, corrections requests, or technical oddities which may need special attention for digitisation. They also mention the difficulty of reaching a coherent and useful description of physical problems. They offer no clear answer and no precise database solution, but most agree that physical condition and technical requirements should be noted during the process. Bar coding is rarely used but is considered a useful future possibility.

It is interesting to note that many archives (film and broadcasting) have difficulties quantifying their holdings and needs per carrier type. Some could provide number of items but not in related hours; most did not provide shelf lengths, or estimated growth. In addition, many express a lack of quality collection condition information. This could hamper selection procedures and cause difficulties in a

proposed factory approach. Archives clearly need help in quantifying their specific carrier holdings and related preservation needs.

Batch vs On Demand Preservation

Film and broadcast archives employ the batch preservation method more (used 70% of the time or greater) than the preservation on demand method. Nearly two-thirds of the broadcast archives who responded perform batch preservation 70% or more of the time. Only 20% of the broadcast archives perform preservation on demand more than batch preservation. 50-50 batch to demand preservation is performed by 13% of the broadcast archives.

Of film archives responding, 80% perform batch preservation 98% of the time or more. 50-50 batch to demand preservation is performed by 20% of the film archives.

Preservation Workflow	% of Broadcast Archives	% of Film Archives
Batch Preservation Performed >70% of the time	60%	80%
Batch-On Demand Preservation Equally Performed	13%	20%
On Demand Preservation Performed >70%	20%	
% Unknown Methodology	7%	

When asked about their experiences with batch preparation, many broadcast archives recommend batching similar materials and providing clear instructions for handling, processing and quality checking. Grouping similar items does result in savings. Film archives gave mixed responses. They view batching favourably, as a cost-saving factor; but cost estimation may pose a problem due to uncertainty in time scales (eg. to grade material).

Shipping

Regarding shipping, some broadcast archives propose improving containers and trucks in order to maintain climate conditions and protect materials. They also express the need for the highest level of security (in terms of contractor selection, insurance contract). Special mention is made concerning the care of shellac disks and nitrate films. Film archives also stress protection and security conditions and some insist that film masters should be given special care and insurance.

Preparing Playback

Most broadcast archives insist that appropriate item preparation is required. In particular, cleaning has to be performed before playback, at least for disks, film, and old tapes, in the view of protecting the decks, items, and facilitating throughput, although there are divergences in opinion on whether repair and cleaning is required at this stage and on whether it should be done in-house or by the contractor. They request inspection tools, and mention that skilled technicians will still be required to decide which kind of preparation and process is required.

Film archives consider cleaning mandatory to avoid damages to the media and equipment, and to achieve the best results. They suggested few improvements in the preparation stage, but did insist on the need to systematically approach playback preparation.

Operators and Transfers

A majority of broadcast archives report between 2-5 operators on staff performing transfers full time. The primary practice for film material and disks is to employ one operator per transfer. For video and other audio materials broadcast archives sometimes employ one operator doing multiple transfers; however, one operator one transfer is used more often. (See appendix 4 for more detailed operator/transfer data).

Few film archives could provide this information; those that did reported one operator per transfer was the standard approach taken.

Playback and Digitisation

Survey respondents were asked about their approach to playback and digitisation, particularly regarding supervision, the role of automation and possible needed improvements with respect to playback tools.

Currently for broadcast archives, the process is mainly supervised by way of human control and manual technical reporting. As far as semi-automatic supervision for audio is concerned, use of NOA and/or Quadriga is reported, with favourable comment. They request requirement definitions for reporting head clogging, mechanical damages and tracking errors. There is a strong expectation concerning monitoring tools, i.e. tools that will allow cleaning and transfer to go partially unsupervised, stop failed transfers, raise alerts about problems, and allow an operator to later, quickly access and check sections where alarms were raised.

Film archives believe there is no alternative to constant supervision during playback of film material. No experience on automation is reported. All the archives state that automation is not applicable for digitisation of film and no requirements are expressed. One archive commented that, in some conditions, an automatic telecine grading tool may be useful.

Service Provider responses reflect different approaches, often based on the service level agreement with customers. Full, permanent, on-the-fly control is exercised by an operator, sometimes on two (occasionally more) different streams simultaneously. Start/middle/end checks are often performed afterwards. In their opinion, film transfers can hardly be automated. A few required technical improvements are identified as well; for film, faster than real time, multiformat, multiresolution and tolerant to physical defects was one request. They agree that automated solutions for video cassettes would be appreciated but will require reliability (concerning defects), flexibility (in terms of formats) and integration into process management. Also concerning audio and video: correction tools and automated quality control, including metadata generation were requested.

Quality Management

In general, many different quality management techniques, from manual to automated, from spot check to complete review are used in broadcast archives. Many rely on generated technical reports and spot checking is common. However, some archives review material manually at every stage in the process while others rely entirely on software for quality analysis. Few film archives responded to this question; one checks material once it is returned to the archive and the other estimates the quality on a representative sample but hopes to implement quality management in the near future.

More specifically, broadcast archives perform quality control with manual or operator checks, divided between spot-checking and systematic checking. They stress that quality control could be maintained by exploiting the measurement made to video signals (programme integrity, duration, time codes) and in some cases, to internal signals from VTRs (dropouts, recording levels). Many archives spot-check (for cost reasons), but often implicitly rely on systematic operator supervision during transfer. For some collections or archives, systematic checking is practised after transfer (for low-volume/high-value collections principally). It appears that on-the-fly validation is useful for stopping a transfer if required, and for quickly logging down problematic sections. Most also mention that delayed validation should complete this check. A reference to missing programme ends is made, implying that delayed checks should include verifying programme start, middle, and end.

Most film archives rely on high level operator skills for getting the best results and verify afterwards. One reference is made to additionally spot-checking the results (for cost reasons). The use of automation in quality control is not considered possible for the foreseeable future because film archivists feel that quality control relies on human interpretation. Systematic control of results (and original films) is practised. Concerning validation, both types are mentioned: "On the fly by operator", to allow immediate feedback and problem correction; and "Delayed" in order to allow third party validation.

When Service Providers were asked about their approach to quality control (including what could be automated), several insisted on the need for systematic human control during transfer, completed by spot-checks at start, middle, end, and previously logged sections. They also insist on tools for logging automatically during transfer, critical parameters, and on the ability to link to problematic sections later, hereby allowing spot-checks. They feel that even for difficult media, the following technical data should

be reported automatically: number and location of dropouts, recording levels, duration and file control. Most insist on systematic real time checking during transfer and spot checks afterwards. To save time, on the fly control is preferred to detect and correct rapidly. Delayed validation based on systematic overall check (such as file integrity), and on spot-checks, is required after any automated process.

Updating Archive Databases (metadata)

Only 50% of the broadcast archives report automated labelling and 31% of archives report automated metadata production (film archives were not asked).

Most broadcast archives manually update information generated during digitisation (item, file, or cassette numbers). Some use barcodes to speed up this process and reduce errors. Some of them log technical metadata in the media files (as MXF). Tools are required to export technical data (in XML) to the archive database, and to make it accessible and easy to understand.

For the moment only manual updating is done in film archives. Generation of technical information during digitisation is often not done. Even when it is delivered, this technical information is often not imported. A desire to have both steps occur in the future was expressed.

When Service Providers were asked about their experiences with updating information, their answers were not very informative (this could be attributed to the fact that perhaps the question is more oriented towards archives than service providers). However, two service providers mentioned direct recording and export of subtitles and closed caption (although this may only be applicable to recent broadcasts). Only one mentioned exporting all the technical and quality control metadata for the customers. How the customers use these records is not described.

4.3. Feedback on PrestoSpace Deliverables (Preservation Area)

The broadcast archives' responses concerning the need for automated preservation tools reflect both the importance of planning preservation programmes and the urgency of some actions. All the broadcast archives require automated preservation processes in order to deal with large volumes. Interest was expressed for (in order of decreasing interest): minimal supervision; high level of quality monitoring; robust devices to limit failures. (See appendix 5(1) for rating). These are the three main features of industrial processes. In addition, the survey confirms that tools for assessing the condition of materials are urgently needed. Archives identified lack of condition information as one of the primary problem areas when planning digitisation projects.

- **Tape Condition Assessment:** *Low-cost detectors are requested for tapes and technical solutions are expected which can return tapes to an acceptable playback condition.*

Broadcast archives express a great interest in a tool which could help them assess the physical and chemical state of film and tapes. In addition, when asked what they specifically needed information about, their first choice was information concerning checking material before playback (and to aid in selecting material for automated processes). Their second choice was for information on detecting materials needing urgent transfer and third, information on monitoring tape storage.

Service Providers express global interest in these detectors; one in particular wants to know if it could detect oxide loss. However, some felt this type of assessment to be the client's responsibility. When asked to indicate what they are most interested in knowing more about, the first is information on the selection of the most urgent material to transfer. This is followed by tapes storage monitoring and lastly, information on checking before playback. (See appendix 5(2) for ratings).

Their expressed preference in learning more about which materials urgently need transfer is logical since that is their future market; they need to have the in-house capability to handle these materials. Knowledge on tape storage monitoring is also logical since many identified storage as a future possible service area. That they found information concerning checking before playback least interesting possibly confirms their assumption that the client is responsible for checking materials to be transferred during the preservation selection process.

- **Affordable Robust Datacine:** *Current telecines are not adapted to archive film conditions and not suitable for massive transfer. It must be robust, run unsupervised as much as possible and provide a resolution compatible with archive requirements. It will gather*

information on the position and level of defects and will include a temporary disk buffer and offer different file format export.

Broadcast archives confirm that an affordable robust datacine is needed. For them, the 16mm format is a priority, combined to 35mm. The features in order of priority are: Robustness, Resolution and Price. This illustrates that for broadcast archives, the sheer amount and physical condition of films is still a big problem.

The three responding film archives require an affordable robust datacine for both formats. For them, the priority order is Resolution, Robustness and Price. This reflects the quality requirements in the film exploitation domain.

All the service providers expressed interest in the datacine, for both formats. Features in order of priority are: Price followed by Resolution and Robustness of equal importance. A majority of those responding expressed an interest in being involved in the conceptualisation of such a product as well.

- **Audio Tape Player:** *playback of old audio recordings currently requires the intervention of a skilled operator and is time consuming. The improved audio tape player will use special processing tools which will achieve automatic fine tuning and provide the best playback quality.*

Of the broadcast archives responding, only half are interested in the improved audio tape player (This could reflect the smaller number of audio holding archives participating in the survey.). The most interest was for 9.5 to 38cm/s which are professional speed recordings. The same archives express an interest in improving SepMag playback.

Service providers express a strong interest in the audio tape player and like the broadcast archives, had the most interest in speeds 9.5 to 38cm/s. However, a few responses indicated interest for all speed types. 3 of the 5 responding were interested in improving SepMag playback.

- **Audio Disks Contactless Playback Device:** *Playback of 78rpm and vinyl disks requires considerable operator effort including cleaning, choice of stylus and preventing new damage. Optics and image processing tools will improve playback robustness, improve quality related to dust, etc and will reduce digitisation time.*

70% of the broadcast archives responding reacted positively to the need for an audio disk contact-less playback device.

- **Automated tools integrated with robotics for use in the handling and playback of audio and video cassettes**

Although the general aim of the PrestoSpace project is to develop technology working as much as possible unattended, it is important to note that archives and Service Providers are apparently unconvinced that automation is appropriate in all stages, particularly concerning quality management.

There is almost complete agreement among broadcast/film archives and Service Providers, that during the playback and digitisation phase, automation can play a role in handling and playback, as well as in report generation, but not in quality related assessment. The majority believe that "on the fly" quality assessment, performed by an operator, is essential during transfer; automation is more acceptable during post transfer for spot checking and validation.

Concerning which media need to be focussed on first, opinions concern more than one medium; however, broadcast archives believe automation efforts should first focus on film and SepMag (due to the expense) and open reel video (due to equipment obsolescence and media fragility).

Service Providers related little experience in current automated processes. In their opinion, automation efforts should focus on film reels and open reel video since they are in high demand and physical degradation is more critical. (See Appendix 5(3) for ratings)

- **Information System for Preservation Management:** *the project intends to develop a lightweight control system which will include all workflow information (from content and media references to operational reporting and quality control data during digitisation). The information will be provided either through a turnkey system or an export module (for those archives with an existing digital information management system).*

As mentioned earlier, the need for an information system is confirmed in the survey responses. Broadcast archives admit that using simple tools (Excel/Access) can lead to technical information loss. In addition, most archives are still manually updating information generated during the digitisation process. Employing an information system would ensure all generated data is maintained in one place and can be exported more easily to existing archival databases. Archives express the need to be able to register and track all information concerning the preservation process in a system, one that is preferably connected in some way to their existing holdings documentation. This same conclusion appears in other areas of the survey, e.g. in the Restoration and MAD Work Areas.

Deliverables rating

When asked to rate all tools in terms of relevance to their needs, the following order resulted (from most relevant to least; 100=highest score):

75	Automated Video cassette preservation tool
69	Information system for preservation management
59	Automatic tape condition measurement tool
53	Manual tape condition assessment tool
38	Contactless playback tool for audio disks
35	Affordable robust datacine for archive films
31	Improved 1/4 inch audio tape player
25	Automated Audio cassette preservation tool
25	Automation of difficult media

Additional tools requested concerned a CD-r and DVD-/R quality control tool and comprehensive video transfer automation (where one operator can transfer multiple videos simultaneously). Another expressed interest in a cost-effective digital preservation solution for 16mm film.

Service Providers rated the tools as follows :

79	Automatic tape condition measurement tool
71	Affordable robust datacine for archive films
64	Automated Video cassette preservation tool
50	Automation of difficult media
50	Manual tape condition assessment tool
50	Automated Audio cassette preservation tool
50	Information system for preservation management
29	Contactless playback tool for audio disks
29	Improved 1/4 inch audio tape player

The Service Provider's rating reflects their market interest in video and film materials: film and video related tools are ranked higher than audio tools. It is important to bring to their attention however, the large amounts of audio material identified by the archives as needing urgent attention, a market clearly offering them opportunities for growth.

4.4. Summary of results on Preservation/Digitisation

The current broadcast archive approach to preservation is to rely on operator control of one or sometimes several (for audio) transfer chains. Spot-checks on start/middle/end/problematic sections are usually performed to complete the process. Automatic quality control is not used for video, sometimes for audio. Tools are really required for automatic video quality control. There is consensus on bar-coding, on the use of batches, and on the lack of appropriate tools for generating and exploiting

reported quality control information. Divergences appear on selection (prioritisation) policy. Film remains a problem because of the costs and material preparation needs.

Film archives often do not have the same massive digitisation policy as broadcast archives. They digitise less, count much more on the professionalism of telecine operators and spend more time verifying. Film archives are interested in automation, but approach its use more cautiously. The general understanding in film archives is that digitisation, in its current development, is not a preservation methodology, but is rather access oriented.

In contrast with broadcast archives, several Service Providers have already started running multiple transfer chains in video. They often run spot-checks on start/middle/end/problematic sections and express a strong interest in automation and quality control during transfer (even for open reel tapes). They demonstrate some flexibility with respect to their customers requirements. They sometimes offer their customers the technical metadata generated during playback, but they do not know how these are exploited. Doubts continue to remain concerning possible automation of film digitisation which still requires on the fly supervision.

Finally, most broadcast archives require improvements in automation and there is a common requirement for a more industrial approach to the preservation process. Improvements in tape condition assessment tools, robust devices and quality control reporting are expected.

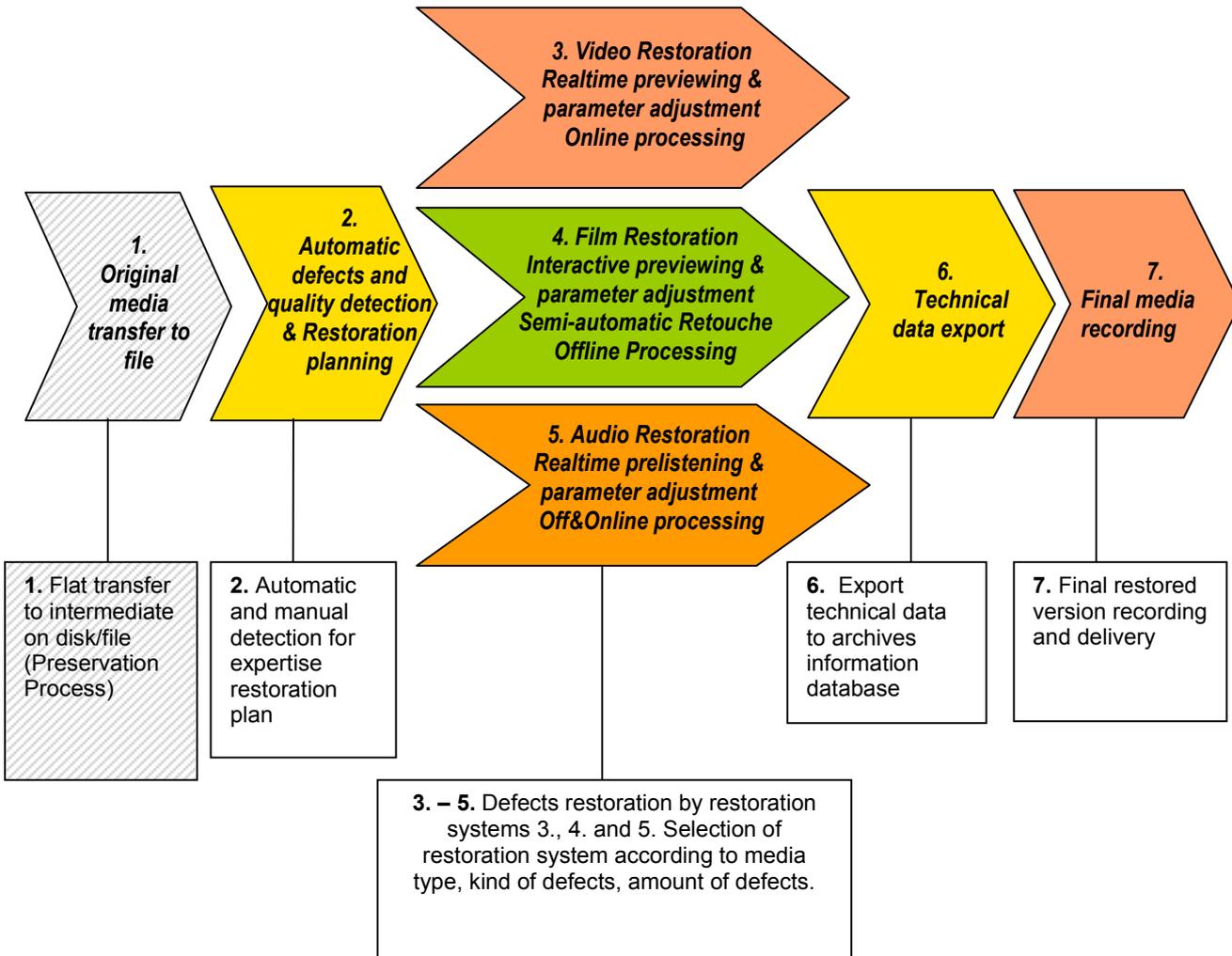
5. Work Area 2: Restoration Process

5.1. Background

5.1.1. Addressed problem

The restoration work area has the objective of providing an integrated restoration system for film, video and audio which will be integrated into an overall preservation factory. It will address the tools needed to manage the restoration process including automatic analysis of material prior to restoration (allowing more informed decision making), high level restoration modules for film, video and audio and production of standardised defect and quality descriptive metadata.

Work Area 2: Restoration Process



5.1.2. PrestoSpace Approach

The first step in the process is to make an intermediate to be restored, either a tape or a file depending on the technical process. This intermediate is usually made without any correction. The second step involves analysing the signal and annotating information on content structure, quality and defects. This provides the operator with a complete expertise report with which to evaluate and develop the restoration work plan. Restoration is the third step, involving real time decision making concerning parameters and filters. The video/film/audio restoration results in a restored intermediate which contains the results of all corrections made during media restoration. During this process, very detailed information can be gathered, e.g. defects and quality status of original media, corrections applied, etc. Finally the restored version is delivered to the archive.

5.2. Survey Results on Current Restoration Workflow Process

In general, those responding have done very little or no restoration work due to time constraints and could offer little detail on how they proceed.

Transfer to digital intermediate

Most of the time broadcast archives use some sort of digital tape format as intermediate (which is often also the final result of the digitisation step). The intermediate (final) format most often used is digital beta; DVC Pro 50, DV and data files are also used. For audio BWF and other file formats are used. After transfer to a digital tape format, some apply at least colour correction.

There is essentially no difference in the described Service Provider approach: after mechanical repair the material is either telecined or scanned. During this first transfer step sometimes colour correction is applied. Then, depending on the original format, the intermediate formats used are: Digital Betacam, HD-tapes or data files.

Automatic defect and quality detection/restoration planning

Broadcast, film archives and Service Providers were asked to list their most critical defects so that the proposed PrestoSpace tools would be designed with these problem areas in mind.

For video, broadcast archives identified the most critical defects as drop outs and noise. Service Providers also mention compression artefacts and colour change.

Broadcast archives identify the most common defects for film materials as: vertical scratches, image jitter/instability, colour fading, dust/dirt/blotches and splices. Film archives add missing parts/frames and Service Providers also identify mould/fungi and noise/grain as problematic. One archive stated that defects globally affecting the image are considered more serious than single frame defects.

Regarding audio: hiss, noise, fizzes, drums, meowing, distortions and sizzling were identified.

Media fragility and deterioration were stated as general problems by archives and Service Providers alike (things such as worn tape edges, folded tapes, "white debris", open splices, etc.). One can infer from the responses that more focus is made on image restoration than audio restoration.

When image and audio restoration is performed it is done so in separate processes.

Video and Film Restoration

Broadcast archives consider speed the main factor in video restoration. This should be achieved with a high degree of automation and should occur mostly unsupervised. Workflow integration is important as well as skilled technical staff. The cost of restoration is mentioned by only a few archives. There is no consensus on price, but all agree it must be affordable.

Most broadcast archives agree with the proposed PrestoSpace workflow for film holdings. Vertical scratches are stated most often as a problem, but colour fading, vibration, flicker, blotches, grain and destroyed frames are also listed often. They feel that the restoration process should yield high quality results and should not introduce new defects.

When asked about film restoration costs, broadcast archives provided few price indications. Some mention that the cost for a restoration system should not exceed €100.000 (considering €200.000 as the cost for the full digitisation station); or that the cost of an individual restoration should be from €13.000 to €55.000 for a film. Most consider automation the key to keeping operator time and costs low and is highly desired. Regarding resolution, broadcast archives feel it should be appropriate for the type of material (e.g. 1080x1920 is considered minimally acceptable for 16mm film).

Film archives emphasize high quality results (without introducing any artefacts) and changes only where necessary. This is much more important than a highly streamlined workflow. Regarding defects, scratches are most often mentioned, differentiating between physical scratches and copied in scratches. As to cost, film archives believe the restoration system should have reasonable throughput at an affordable price.

Service Providers identify flexibility and adaptability as the key to providing a service compatible with customer requirements. They believe internet use should be considered - allowing material exchange

with remote customers and giving them the opportunity to comment. Other points: time for proxy setup and digitisation should be kept minimal; real time systems should be disc based, offer the ability to “undo” and be inexpensive, requiring minimal manpower through maximum automation. They agree with the archives that restoration should introduce no/minimal artefacts. Lastly they mention that real time HD restoration should be taken into account.

Only some service providers stated target prices, e.g. the price for the system should be in the range of € 75.000, or that the targeted customer-price should be in the range of € 300,- to € 600,- per hour depending on the level of restoration. They agree that customer prices have to be easily affordable for the archive market.

Audio Restoration

Broadcast archives focus on automatic operation and consider it possible in many cases, although they believe that automation is of limited use for heavily worn carriers. They also feel that both the original version and restored version should be stored. The number of unsolved problems is lower than that for image defects. Wow and flutter, crackled disks, azimuth variation and clipping are identified.

Film archives do not believe that the audio restoration workflow can be fully automated, as it is a delicate process. They also emphasize that the system must be affordable. Defects identified by film archives include meowing caused by speed problems and sizzling. One archive states that current automated sound restoration leads too often to distortion which is worse than the problems they want to solve. Constant human supervision is needed.

For Service Providers it is most important that the workflow is easily adaptable to different customer requirements. For example, some feel it should be possible to do audio restoration in parallel to image restoration.

Technical Data Exploitation

Broadcast archives unanimously agree that as much information as possible concerning the restoration should be supplied, especially on what has been done and where. Some archives currently generate basic documentation on the restoration process. Current defect and quality related metadata are stored either in legacy databases, spreadsheets or within special parts of the storage file (e.g. in BWF). MXF is considered one of the future formats for storing this data. They also believe that defect and quality metadata should be stored in a database as well as with the data files.

Almost all broadcast archives express a strong need for defect and quality related information – even when restoration is not performed; it is particularly helpful when an item is to be re-used.

For film archives, technical data should encompass two parts:

- Information on the status of the original material: colour content, image defects, sound defects
- Information on the restoration process: corrections applied together with correction parameters.

The importance of knowing the status of original material when there are no plans to perform restoration work differs among film archives; some consider it valuable, others do not need it. Currently, film archives are not storing defect and quality related metadata although it was mentioned that it would be desirable to integrate this data in database systems.

Service Providers confirm this approach to technical data: they believe it should include what has been done and where; in addition, keyframes should be used to document defects which could not be restored. Currently their defect and quality related metadata are stored mostly in spreadsheets; AAF is mentioned as a possible future format to store this data.

The Restoration Work Area must work closely with the other Work Areas in defining data standards to ensure that newly generated technical data are made accessible in the proposed preservation database.

Final media delivery

In broadcast archives the restored version is in most cases stored on digital tape. For video the final result is stored on Digital Betacam in most cases. For film the results are stored on film again although some archives use Digital Betacam for 16mm film. For audio BWF is used. In addition to the high-quality master, viewing/oral versions are often stored in different formats, e.g. MPEG-1/2/4 (stored partially on CD) or audio CD.

For film archives, the result of the restoration in most cases is another film, although storage on hard disk systems are planned for the future. Additionally, tape copies are made (Betacam SP, Digital Betacam).

Service providers deliver the restored version, on a carrier specified by the customer, together with a restoration report to the customer. Similar formats are mentioned: Digital Betacam is used for SD material; film and HDD5 for higher resolution material. The following data tape formats are used: DLT, S-DLT, DTF, and LTO.

5.3. Feedback on PrestoSpace Deliverables (Restoration Area)

- **High-level restoration modules.** *Film and video restoration focuses on: scratch removal, grain suppression, dye fading and motion estimation for overall improved restoration quality. Audio restoration focuses on wow and flutter and film soundtrack restoration. The modules will be implemented as plug-ins for the software-only digital film and audio restoration tools*
- **Improve the hardware video restoration tool.** *This system should provide to the professional operator all the tools to restore digitally, at affordable cost, video resolution programmes. The real-time processing should ensure a quick and efficient reviewing of the restoration process.*
- **Improve the software-only digital film restoration tool.** *This tool will (a) exploit high processing power needed for high resolution film restoration by a computing farm approach, (b) enable interactive restoration with automatic and manual restoration capabilities and (c) provide a plug-in interface utilised by the high level restoration algorithms.*
- **Improve the software-only digital audio restoration tool** *by integration of new high level audio restoration algorithms, e.g. wow and flutter, film soundtrack restoration*
- **Develop a Restoration Management Tool** *providing a single point of information for restoration related decision making and management for the restoration operator. It provides an overview for material to be restored with automatic defect analysis results, with information on status and progress of actual restoration. It provides workflow integration of existing restoration solutions for HW- and SW-based film, video and audio restoration tools*

Deliverables rating

When broadcast archives were asked to rate these proposed tools in terms of their relevance, high-level restoration algorithms are given the highest priority.

Rating (highest level to lowest):
100=highest

61	High-level restoration modules
50	Restoration Management Tool
47	Digital audio restoration software tool
43	Digital film restoration software tool
43	Digital video restoration hardware tool

Film archives register equal interest for all the proposed tools. They agree that the restoration systems currently available have potential for improvement and request the integration of sound restoration functionality or compatibility with existing audio restoration systems.

Service Providers express a high level of interest in all the deliverables. Their rating however differs from that of the broadcast archives:

92	Digital video restoration hardware tool
83	High-level restoration modules
83	Digital film restoration software tool
83	Restoration Management Tool
67	Digital audio restoration software tool

5.4. Summary of results on Restoration

It appears from survey responses that most agree to the proposed workflow as no new services were requested. There is also a consensus concerning the problem areas PrestoSpace needs to focus on. In relation to defects, vertical scratches, image instability, colour fading, dropouts and an overall improvement in restoration quality should be targeted. In addition, technical data standardisation is an issue that needs to be solved among PrestoSpace work areas.

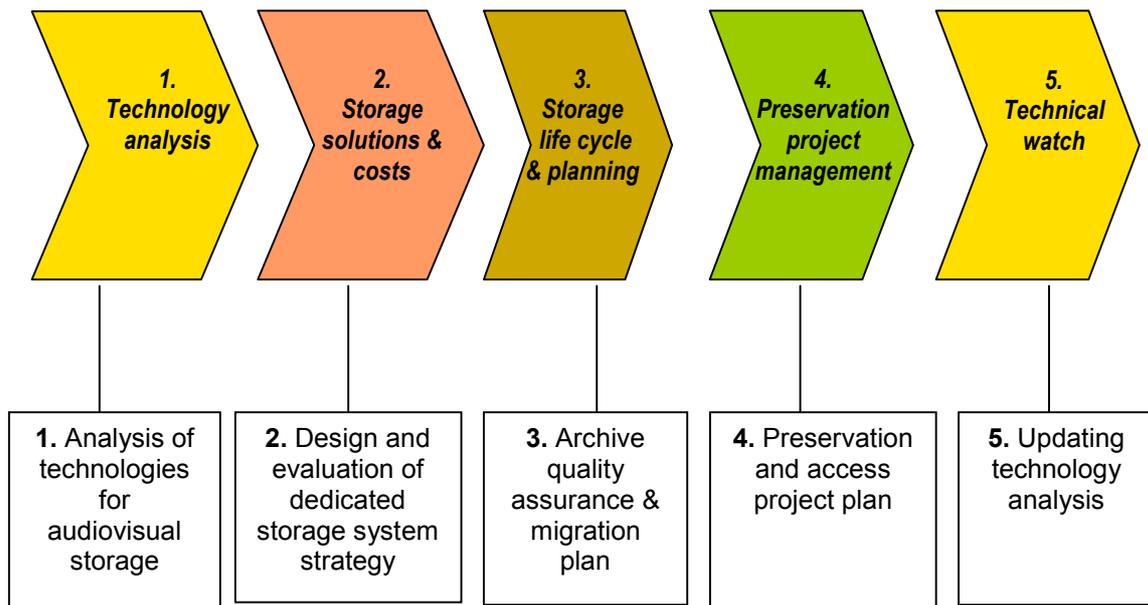
6. Work Area 3: Storage and Archive Management

6.1. Background

6.1.1. Addressed problem

The objectives of the Storage and Archive Management work area are to supply to audiovisual archives of all size, all the needed information and management tools, so that they can develop and keep track of their own preservation and exploitation plans. This involves providing tools on digital technology for the storage of film, video and audio content as well as providing help in setting up long term investment plans and return on investment plans. A key component is to provide an answer to the question “is digital mass-storage safe?” by providing detailed technical requirements and “best practice” management procedures for assured long-term digital storage.

Work Area 3: Storage and Archive Management



6.1.2. PrestoSpace Approach

The first step is to analyse current storage technology. Secondly, comprehensive and up-to-date information about storage solutions and costs is made available on a website. The third step is to aid archives in calculating the storage life cycle and planning. Lastly, preservation project management will be made easier by the use of tools designed to help archives stay on plan and monitor the quality of their preservation effort.

6.2. Survey Results on Current Holdings, Storage Technology and Migration Plans

Archives were asked to identify types of carriers currently present in their archives as well as estimates on yearly growth. It is clearly not possible for all archives to quantify their holdings. Some could provide number of items but not in related hours; most did not provide shelf lengths, or estimated growth. It can therefore be assumed that actual holdings are greater.

Film Holdings (Broadcast Archives)

14 of 17 archives responding

Carrier	No. of cans/tapes
16mm (all)	39.342
16mm COM MAG	14.681
16mm COM OPT	15.142
16mm negative	256.094
16mm print	833.497
16mm reversal (all)	1.240.203
16mm reversal edited with cellophane tape	25.376
16mm SEP MAG	845.410
16mm silent	28.220
35mm (all)	592.417
35mm COM MAG	1.512
35mm COM OPT	5.300
35mm negative	121.341
35mm print	156.663
35mm SEP MAG	42.386
35mm silent	12.700
Others.	8.573
Total	4.238.857

(The category "Others" and "16mm/35mm all" includes: 35mm silent negatives, sound negatives, 70mm and ¼ inch audio sound tracks as well as data from archives who could not differentiate between types of 16mm or 35mm.)

Film Holdings (Film Archives)

5 of 5 archives responding

Carrier	No. Of Cans
16mm b/w	8.425
16mm colour	3.655
16mm silent	1.180
35mm b/w	43.139
35mm colour	139.748
35mm nitrate film	424.787
35mm safety	806.887
35mm silent	25.030
35mm sound	212.857
Total	1.665.708

Video Holdings (Broadcast Archives)

16 of 17 archives responding

Carrier	No. of cans/tapes
Vhs	1.381.892
betacam sp and 1/2"	1.268.483
digibeta	722.752
1/2" MII	443.159
3/4" total	682.223
1" total	607.352
2" total	201.805
D1-D6	589.656
DVC pro/cam	92.383
DVD	22.376
HDCAM	300
IMX	52.000
Others analogue	28.000
Others digital	138.892
Others	1.079
Total	6.232.352

(Others digital includes: digibeta and D3 (by archives who couldn't differentiate in numbers), "Movie" Files in Quick Time, MPEG1+2 and Windows Media formats; Others analogue was not specified; Other includes: unspecified formats and video games)

Audio Holdings (Broadcast archives)

12 of 17 archives responding

Carrier	No. of cans/tapes
¼ inch tapes	2.764.543
shellac	505.242
CD	740.983
DAT	381.084
cassettes	211.659
LP vinyl	312.235
Others. Please specify	316.650
wax cylinders	2.910
minidisc	1.495
78 RPM vinyl	84.500
Total	5.321.301

(Others includes: 45rpm vinyl, CD-R, multi-track audiotapes (analogue and digital), direct cut discs, MP3, WAV, Tandberg QIC, Wire, VHS, Umatic-PCM, DDS)

In addition, broadcast archives were also asked to identify what additional carrier types they expect to become part of their archives in the (near) future. The following types were identified:

Types

Video Tape	D2, Betacam SP, Digital Betacam, DVC PRO
Video Tape with file format	IMX
Data Tape	AIT3, DTF2, LTO, SDLT, DLT
Optical Disk	CD-ROM, DVD
File format	MXF
Hard disk	(type unspecified)

Storage technology analysis

Broadcast archives and Service Providers were asked to identify the overall storage technology now in use. The bulk of archive material remains on shelves, but nearly half of respondents have significant mass storage systems: Shelves: 2 million hours in 12 archives; Mass Storage: 100 terabytes in 5 archives. The actual amount already committed to mass storage is relatively small, indicating that most archives haven't yet made major investments. This indicates the need to supply relevant storage technology information.

Service providers were asked about their use of conventional media, CD & DVD, tapes and robots, and file formats on hard drives and if they had a preference. Usage and preferences were very uniformly distributed, no clear favourites or problems were identified.

Storage solutions & costs

Both broadcast and film archives were asked to identify the kind of information they need concerning storage solutions and costs in order to develop a sound preservation plan. Responses indicate that broadcast archives can find suppliers but can only to some extent work out their own storage capacities. What they want is other forms of information about storage and in particular, about migration. Their main need is for information on new technology, especially related to hard drives. Second was information on security and longevity of storage technology, and third information on costs and on standards.

From the responses, film archives appear to be under slightly less pressure for urgent and total change of the collection. However, they do express a need for PrestoSpace information. They were mostly interested in basic information; virtually all responses in all areas indicated that they wanted more information in the area of Storage Solutions & Costs. The information they most wanted was about media longevity. Film archives want to minimise transfers to new media, and see media life as the determining factor. Other audiovisual archives have a shorter timescale between transfers, because of format obsolescence (which can occur long before media life expires).

Half of the Service Providers felt they were up-to-date on storage media, systems, suppliers and capacities. They felt the real need for information was in the areas of security, longevity, technology change, efficient migration and cost. (See appendix 6 for information needs ratings).

When asked about their experiences with different kinds of storage technology, it appears that, generally, the newest technology for media (files on servers) was not in widespread use, and was seen as expensive, unreliable, and most of all as requiring much more staff and customer training. Very few problems were cited with conventional media despite the fact that all archives intend to change their archive technology in the next decade.

Storage life cycle & planning

When asked about their plans to change storage technology, all the broadcast archives and Service Providers reported they will be changing their storage technology in the next ten years. Three of five film archives indicated they were considering investing in a large scale digitisation infrastructure within the next ten years.

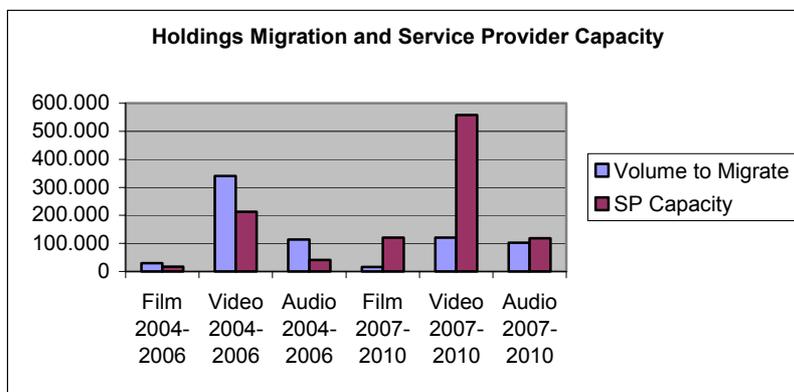
Current Migration Plans

Archives were asked to provide future migration volume. In addition, Service Providers were asked about their capacity to handle film, video and audio during the same periods. The result: an apparent lack of capacity for the migration of all material types in the period 2004-2006.

note: the 2007-2010 estimate increases are primarily the result of one service provider's estimate; this service provider did not include film estimates for 2004-2006, and reported dramatic increases for 2007-2010

Migration 2004-2006	Volume to Migrate	SP Capacity
Film	29.168	17.500
Video	340.540	213.000
Audio	113.600	41.000

Migration 2007-2010	Volume to Migrate	SP Capacity
Film	15.940	121.000
Video	121.080	557.500
Audio	102.700	118.000



Estimated Costs of Migration and Estimated Budget

When asked to describe their current migration plans (volume and estimated associated costs), archives could provide volume/hours more easily than associated cost figures. Because the cost/volume ratios differ so greatly between archives, no extrapolation was performed to determine a total estimated cost. One can assume that the actual costs are higher than indicated in the table below because not all archives who contributed volume figures, contributed cost figures. However, it does provide some indication as to the magnitude of costs involved in future migration plans.

In addition, archives were asked to provide available budget figures for the same periods. Again, many were not able to supply figures so the total budget figures may in fact be larger.

Broadcast and Film Archives

Film Video Audio Migration	Costs	Available Budget
2004-2006	57.841.500	24.805.000
2007-2010	38.730.500	54.330.000

Difficulty in supplying cost information may indicate that archives are not yet ready to implement a business case approach to preservation migration (where cost to volume ratios are required), and need tools for anticipating their migration costs and budgets.

Types of Migration

Archives were asked to list the kinds of migration they expect in the above mentioned periods. The results indicate again the lack of standardisation in choice for migration carriers and formats. However, there are clearly plans to migrate holdings to digital formats. It appears that the majority of

film will be migrated solely to low resolution access formats whereas the chosen target formats for video and audio are often full resolution.

Film Holdings	Video Holdings	Audio Holdings
Target Carriers	Target Carriers	Target Carriers
35mm/Polyester	Betacam SP	Hard disk
Digital Betacam	Digital Betacam	Tape robot
Hard disk	Data tape	LTO Tape
Data tape	SDLT	DVD
Server	LTO	CD
DVD	SAIT	
DVC Pro 50	Server	
CD	DVD/DVD-R	
	DVC Pro	
	IMX	

Film Holdings	Video Holdings	Audio Holdings
Target Formats	Target Formats	Target Formats
SDTV component 422 at 10 bits	MPEG2/D10-50 Mb	BWF or WAV
Digital video	Digital video and files	Audio CD
Files	DV 50	
MPEG 1	8M Mbit/s	
MPEG 2		
MPEG 4		
MXF		

Results were complicated by terminology: mass storage, robot, server, hard-drive are overlapping terms; counting 'robotics' and 'data-tape' as the same, about 1/3 of respondents were moving to data-tape based archives, and 1/3 were moving to hard-drives. Most of the remainder were moving to 'mass storage' (18%) or didn't know what they were moving to (12%). There was low (under 10%) interest in CD / DVD storage.

It was very interesting to see what archives are moving from: 1/3 are already moving from some sort of data-tape or other mass-storage technology onto something bigger and better. Most were moving from analogue media, but 15% mentioned moving OFF digital videotape (DVC-PRO 50 and DigiBeta).

Service Providers plan mainly to move to data storage, despite their earlier comments that both staff and customers don't understand this technology sufficiently.

Technical Support Needs Related to Storage and Management

In general, the biggest single issue for broadcast archives is support. There are plenty of storage products and suppliers, but good, affordable support was seen as the major need by 30% of respondents. Technology or processes for quality checking were next on the list. Taken together, the concern is not so much about how to get onto mass storage, as how to stay on it with good maintenance: of the devices and especially of the content. Other results were scattered, ranging from a request for speech recognition to faster transfer technology, neither of which is strictly a storage issue.

6.3. Feedback on PrestoSpace Deliverables (SAM Area)

- **Storage Costs Calculator:** *a software tool for planning of storage for audiovisual preservation. The tools should help archives determine the perceived value of their assets and the quality requirements when designing their storage system strategy.*

As mentioned earlier, all archives express a strong desire for information and help concerning storage technology information and migration. When asked to rate the three deliverables, this tool scored the highest. Service Providers considered this tool useful for providing information to customers.

- **Preservation Transfer Calculator:** *A software tool for strategic planning for audiovisual preservation. The tool will take into account as much data as possible to help the archive management write the Preservation & Access Plan for their audiovisual assets.*

Broadcast archive respondents were not quite as interested in project management as they were in storage life-cycles, though about 40% still consider this need urgent.

- **Quality Control Calculator:** *Tools will be designed to monitor the quality of the preservation effort. These tools will help the managers verify that their preservation effort is running according to plan and assess the quality of digitisation*

Broadcast archive interest was higher (nearly 2/3 of users) for tools and information about quality control of the storage systems that are established during preservation transfer projects.

Film archives and Service Providers were less interested in aids and tools for working with the information. They all expressed an 'in-between' interest in the tools to support Life Cycle Planning and Digitisation Project Management.

Deliverables rating

When asked to rate the deliverables in terms of relevance to their needs, broadcast and film archives produced the following rating (from most relevant to least; 100=highest score)

75	Storage Costs and Calculations
69	Quality Control Calculations
58	Preservation Transfer Calculations

Service Providers rated them as follows:

67	Quality Control Calculations
59	Preservation Transfer Calculator
59	Storage Costs & Calculations

6.4. Summary of results on Storage and Archive Management

There was a plea for storage technology that could, simply and affordably, support both professional (edit quality) and heritage (web quality) requirements. This is more access than storage, but they can't be separated. The Storage and Archive Management (SAM) Work Area and the Documentation and Publication Work Area (MAD) need to agree on how to support multiple levels of access. In addition, the Preservation Work Area has to agree on compatible digitisation/encoding.

7. Work Area 4 : Documentation and Publication Process

7.1. Background

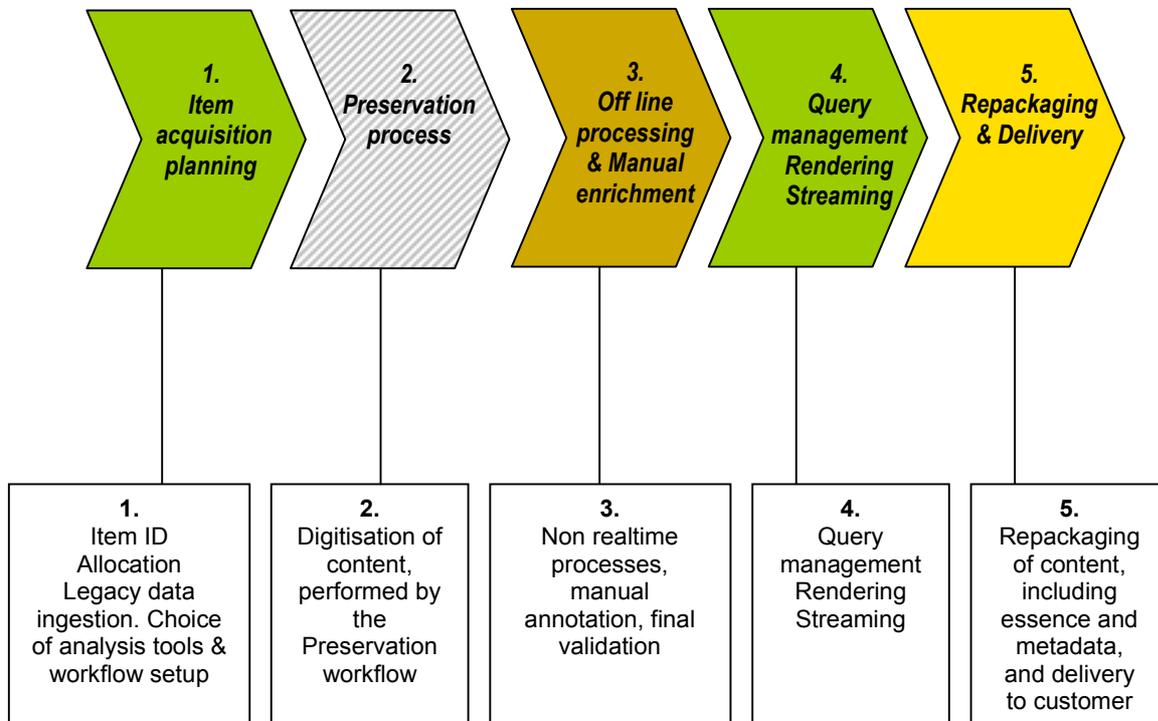
7.1.1. Addressed problem

A key motivation driving the PrestoSpace approach is that an accessible item is more valuable than an item stuck on the shelf.

Access involves: digitisation in item-sized chunks with item-level metadata, rights clearance and management and effective delivery systems for commercial and public access. This involves unsolved problems of automation, metadata extraction, access and end-user delivery.

In order to provide greater public access, a process is needed to manage rights, networks, metadata and media within an economic framework that provides the return on investment that funds the whole process.

Work Area 4: Documentation and Publication Process



7.1.2. PrestoSpace Approach

One of the premises behind the Prestospace approach is that generated information concerning newly digitised content will link up to an existing system containing documentation on holdings (metadata). The user would be able to specify what kind of process must be applied to the current item including the content analysis method, documentation model, etc. The proposal is to employ automatic tools for information discovery on the newly digitised content. The documentalist will then combine this automatic analysis with legacy documentation in correcting and validating gathered information and will then manually complete the documentation according to the model chosen. The documentation is then made accessible in an online catalogue. Retrievability will be enhanced by employing online browsing functionality (use of low resolution images linked to documentation with the aid of key frames). Multilingual issues will be addressed as well. Those (primarily large) archives that already have a corporate advanced archiving infrastructure will probably prefer to import the digitised material and its documentation from the PrestoSpace platform to their own. To simplify this process, the content will be made available in an agreed format based on widely used international standards.

Smaller archives without an existing infrastructure will employ a turnkey system to incorporate new holdings information and make it accessible to the public.

7.2. Survey Results on Current Users and Processes

Current Collection Users

Access to broadcast archive content is primarily given only to archive production staff, staff from affiliated partners or commissioned external companies (which in broadcast archives essentially means broadcasters, producers). Viewing only access is given primarily to qualified researchers or students. Footage use is dependent in all cases, on copyright clearance and licensing. Film archives' largest "user" is the film viewing public (through film screenings). Remarkably, both claim very low numbers of users from cultural institutions (including museums/exhibitioners, other archives and festivals for example). Researchers and private persons also make up only a small part of current users.

75% of the Service Providers consider archival preservation/restoration their primary or secondary service. Their main clientele are producers and broadcasters which make up 58% of their users. Archives/museums-exhibitors/other cultural institutions/festivals and private persons/researchers make up two other user groups, each consisting of 21% of the clientele base. (See appendix 7 for detailed user group breakdown).

Collection Content: Current State

Broadcast archives contain material of heterogeneous type, ranging from news to feature film; news, sport, arts and everyday life collectively pass 50% of the total. Film archive holdings consist primarily of feature films.

Current Processes

Cataloguing/Documentation: Content Analysis Methods and Documentation Models

The budget devoted to cataloguing and documenting holdings is generally quite significant for broadcast archives: almost half of the archives devote more than 40% of their budget to this activity. For film archives however, it is lower than 40%. This is probably due to the type of documentation model primarily employed by film archives.

Major broadcast archives tend to document analytically relevant parts of their collection (often more than 50%) while small archives often produce cataloguing information only. However, no single model can be considered "preferred" as the implied documentation costs appear to be very different. Half of the broadcast archives use a mix of the various models (analytical, synthetic and cataloguing) depending on the programme genre and future usage. In film archives, there is greater reliance on cataloguing only or cataloguing plus description.

Reference/Access

Publication, Search and Browsing

Most archives provide online catalogue access to audiovisual holdings but online access to film material is less than that of video or audio holdings. In broadcast archives, the documentation is stored on electronic media in 95% of the cases. Online access to catalogue in film archives is however very limited. The majority of both broadcast and film archives provide access primarily on-site, on demand. Access from remote locations is practically nonexistent.

In most cases a search in the catalogue will retrieve finished off or published programmes. The cataloguing of edited items and raw material is generally limited. In almost all cases, programmes and physical media are related to each other by using unique identifiers. In the majority of cases in broadcast archives, it is recorded on the media through the use of a bar code. However, barcodes are only in limited use in film archives. No international (barcode) standard is mentioned in this context.

The use of keyword lists and thesauri is very common but there is no indication that a common standard has been adopted. More than half of the broadcast archives, especially the larger ones, use some kind of automatic metadata extraction tool. Often, the task involves conveying information from other areas (production, planning, digitisation) to the archive. In film archives use of this type of tool is uncommon.

Content is retrieved by querying a local or online database, but only half of the archives consider the retrieval performance of their infrastructure satisfying. One of the main deficiencies identified is the unavailability of online previewing. Preview, especially assisted by key frames, is unanimously considered an important feature in reducing the retrieval and documentation costs and increasing reuse of archive content.

Most archives have plans to open their catalogue for consultation to external users in order to promote content use and sales. Everybody believes that the value of their holdings would increase by providing better metadata and foreign language translations.

Repackaging and Delivery

Many broadcast archives already have in house some sort of digital infrastructure for the integrated management of essence and metadata, even though its relevance is not specified in the overall archive context. It is extremely limited in the case of film archives. Other archives mention plans to migrate to digital. Although there is some convergence on the exchange of essence, there is no indication of a common standard for metadata exchange, even if XML is often used.

New Services and Expectations Concerning Digitisation

Increased access through digitisation is the primary focus for the future. All archives are busy trying to increase online access to materials - not just to descriptive information but making content available online. There is therefore great pressure to increase collection digitisation. The goal: increase viewing access and thereby sales through easier and faster accessibility. Better metadata management was also identified as an important goal.

Faster, easier, more accurate and increased use of collection holdings is the primary result expected through digitisation. In addition, better quality metadata delivery and workflow processes were also identified as important results. Increased preservation was also mentioned.

The greatest obstacle to implementing these new services is financial, followed closely by organisational and technological. Almost half of those responding choose all three as obstacles. Copyright and legal issues were also identified as important obstacles.

Rights Issues

Clearly rights management remains an issue. Although 57% of the archives claim between 50% and 100% ownership of their collection, several large archives claim 35% or less. In film archives, half claimed 90% ownership, the other half less than 30%. Furthermore, some archives located in countries where archival enterprises were once nationalised (Eastern Europe) mention that the rights issue has not yet been resolved.

Rights management and automation

75% of broadcast archives use some sort of database to register rights information and it is independent of the cataloguing system database for a little more than half of the archives. For film archives however the opposite is true: 80% do not have a database in use.

Rights examination is still done manually by most archives. And since rights clearance has to be in place before material can be made digitally accessible, this is seen as a drag on the digitisation process. At least 80% find that rights examination slows content delivery; in fact between 5 and 40% of the time, content delivery is prevented.

Between 60 and 73% of film and broadcast archives believe rights examination should be tied to the preservation process, primarily to save money later and to allow new forms of trading.

Many archives expect that reliable rights information will be more accessible via the streamlined work processes and metadata channels required in a digital environment. Most believe this should eventually make rights management easier and faster and can then lead to increased content use and increased licence income.

7.3. Feedback on PrestoSpace Deliverables (MAD area)

- **A Documentation Platform** for assisted content analysis and manual annotation, including tools for helping indexation. This time-based content related information will be transferred to the information system and will be used to enhance retrievability.

The documentation platform rated in the survey as the most relevant to their needs. Given the amount of budget expended on documentation tasks any tools which can speed up and make the process more efficient are welcome by archives. Challenges the PrestoSpace project will have to address include the lack of standardisation in documentation methodologies employed and as well as a lack of standardisation in keyword/thesauri use.

When asked, several users expressed a preference to improving the quality of the documentation while keeping the budget constant, rather than reducing costs and maintaining the current level of service. Automated documentation tools and online previewing capabilities together can lead to decreased expenditure on documentalists staff. Most therefore believe it is more important to increase the usability of the archive (and thus enlarge the business) than to cut expenses.

- **A Publication Platform** dedicated to content retrieval and browsing.

Clearly the survey demonstrates an urgent need for a platform which can provide online browsing of material. Archives consider this a key element in reducing documentation costs and increasing collection accessibility. Such a platform would be more easily accessible from remote locations as well, opening collection access to a much greater public.

- **A Turnkey System** for delivering digitisation results to small archives who do not currently have an infrastructure for delivery of and access to digitised content.

The turnkey system was considered less attractive by survey participants, even though few offered suggestions about additional features needed. A partial explanation may be that small archives were underrepresented within the survey participants, and no large archive is interested in a standalone system (not integrated with the existing infrastructure). It is also possible that the information provided to the survey participants on the role and the features of the turnkey system was not clear.

- **An Export System** for delivering digitisation results to medium and large archives. This system will include protocols for delivery of digitisation results and will be flexible enough to link with pre-existing storage systems and legacy databases.

This system was also considered an important component in increasing collection access. However, accommodating exchange between the various information systems currently in use will be a big challenge as there is demonstrably little convergence in exchange formats for metadata or essence.

Deliverables rating

When asked to rate all the tools in terms of relevance to their needs, the following rating resulted (from most relevant to least; 100= highest score)

Service Providers		Broadcast/Film Archives	
75	Documentation platform	62	Documentation platform
75	Publication platform	50	Export system
63	Turnkey system	46	Publication platform
50	Export system	24	Turnkey system

7.4. Summary of results on the Documentation and Publication Process

The vast majority of archives consider the MAD objectives important for increasing business opportunities. As to the implementation of such platforms and systems: even if large parts of the design and deployment of the technical infrastructure are outsourced, many organisations want to keep the planning and analysis under control. It must also be noted that only half of the archives have an internal IT department which are, in general, quite small.

When the Service Providers were asked to consider these tools, half declare an intention to include programme documentation in their services and consider the MAD documentation and publication platforms the more relevant and urgent to their needs. The turnkey system and the export system rated lower but were also judged urgent by 2 providers.

8. Appendix 1

8.1 Survey Participants

Archives

Short Name	Archive Name	Country	Internet Address
A.Kahn	Musée départemental Albert-Kahn	France	
AM	Technisches Museum Wien mit Österreichischer Mediathek	Austria	www.mediathek.ac.at
B&G	Nederlands Instituut voor Beeld en Geluid	Netherlands	www.beeldengeluid.nl
BBC	British Broadcasting Corporation	UK	www.bbc.co.uk
BFI	British Film Institute – National Film and Television Archive	UK	www.bfi.org.uk
CNC	Centre national de la Cinématographie – Direction du Patrimoine Cinématographique	France	www.aff.cnc.fr (2005)
DR ARC	DR Archive and Research Center (Danish Broadcasting Corp.)	Denmark	www.dr.dk
ETB	EUSKAL TELEBISTA-TELEVISION VASCA	Spain	www.eitb.com
ILS	Istituto Luigi Sturzo	Italy	www.sturzo.it
INA	Institut National de l'Audiovisuel	France	www.ina.fr
IWM	Imperial War Museum	UK	www.iwm.org.uk
MNFA	Magyar Nemzeti Filmarchivum; Hungarian National Film Archive	Hungary	www.filmintezet.hu/
NFM	Nederlands Filmmuseum	Netherlands	www.filmmuseum.nl
ORF	Österreichischer Rundfunk (Dept. Dokumentation & Archive)	Austria	www.orf.at
RAI	RAI RADIOTELEVISIONE ITALIANA	Italy	www.rai.it
SLBA	The National Archive of Recorded Sound and Moving Images	Sweden	www.ljudochbildarkivet.se
SVT	Sveriges Television	Sweden	www.svt.se
Telemadrid	Televisión Autonomía Madrid	Spain	www.telemadrid.es
TVR	Societatea Romana de Televiziune (Arhiva Multimedia)	Romania	www.tvr.ro/SRTV/arhiva/index.htm
YLE-R/TV	Finnish Broadcasting Co. (Television)	Finland	www.yle.fi

Note: Finnish Broadcasting Co. Radio and Television filled out separate surveys (YLE-R and YLE-TV).

Service Providers

Short Name	Company Name	Country	Internet Address
Ascent Media	Ascent Media UK	UK	www.ascentmedia.co.uk
Centrimage	Centrimage	France	www.centrimage.com
Cinedoc	Cinedoc Filmproduktion GmbH	Austria	www.cinedoc.at
MachineRoom	The Machine Room Ltd.	UK	www.themachineroom.co.uk
NOB	NOB Cross Media Facilities	Netherlands	www.nob.nl
OMNIMAGO	OMNIMAGO GmbH	Germany	www.omnimage.tv
ReArc	ReArc Limited	UK	www.rearc.com
Studio Hamburg	Studio Hamburg Atelierbetriebs GmbH	Germany	www.studio-hamburg-atelier.de
Vectra	Vectracom	France	www.vectracom.fr

9. Appendix 2

9.1. Service Providers: Materials Handled and Additional Services

Materials Handled

Film Materials (6 Service Providers Responding)

Carrier	No. of SP
16mm reversal (all)	6
16mm reversal edited with cellophane tape	5
16mm negative	6
35mm negative	6
16mm print	6
35mm print	6
16mm SEP MAG	6
35mm SEP MAG	6
16mm COM MAG	6
35mm COM MAG	6
16mm COM OPT	6
35mm COM OPT	6
16mm silent	6
35mm silent	6
Others.	2

Others: 8mm, 9.5mm

Audio Materials (8 Service Providers Responding)

Carrier	No. of SP
Wax cylinders	0
Shellac	1
78 RPM vinyl	3
LP vinyl	3
¼ inch tapes	5
Cassettes	6
DAT	8
CD	7
Minidisk	5
DA88	6
DASH 24/48	1

Appendix 2 (con't)

Service Providers: Materials Handled and Additional Services

Video Materials (9 Service Providers Responding)

Carrier	No. of SP
2inch B/W	5
2inch PAL	5
2inch SECAM	3
2inch (other standard)	2
1inch B PAL	6
1inch B SECAM	3
1inch C PAL	7
1inch C SECAM	5
1inch (other standard)	4
¾" Umatic LB PAL	9
¾" Umatic LB SECAM	5
¾" Umatic H PAL	8
¾" Umatic H SECAM	4
¾" Umatic SP PAL	7
¾" Umatic (other standard, eg. NTSC)	5
½ inch BETACAM	7
BETACAM SP	9
½ inch MII	5
VHS	7
Analogue tapes without audio	2
Others analogue	2
D1	5
D2	5
D3	3
AMPEX DCT	3
D5	4
Digital BETACAM	9
DVCpro	6
DVCAM	7
DVD	8
MXF	2
IMX	6
HDCAM	5
HD D5	2
D6	1
Others digital.	3

Others digital: Mini DV, Micro DV, DVC PRO HD, Hard Disk

Others 1 inch: NTSC, C NTSC, A SECAM

Others 2 inch: High band and Low band

Others ¾ inch: NTSC

Others analogue: ½ inch VCR, ½ inch EIAJ, ¼ inch Akai, Video 8

Appendix 2 (con't)

Service Providers: Materials Handled and Additional Services

Film Services	% offering inhouse
Sensitive Materials	83%
Lab Printing Equipment	33%
Film Cleaning Equipment	67%
Lab Processing	50%
Rewash Services	50%
Film Scratch Concealment	50%
Polishing, Matting	33%
Film Grading	83%
Rerecorded Sound Negatives	33%

Equipment Makes Used by Service Providers**Laboratory printing equipment**

Bell & Howell, B.H.P., Neilson Hordell, Oxberry, Debie TAI, TCI

Film cleaning systems

Lipsner Smith and CSM (buffer rollers)

Laboratory processing machines

Calder, Filmlab and EI.

Processing includes colour negative photomec, black and white photomec, glass wheel polishing and rewash.

Film grading equipment

Debie, Filmlab, DaVinci 8:8:8:, DaVinci SD, DaVinci HD / 2K , Pandora Pogle and Pixie

Telecine Machines

Type of machine	Number
Philips Quadra – FDL90	2
Cintel Mark III	3
Cintel URSA Gold	5
Cintel URSA Diamond	5
Cintel C Reality	3
Thomson Spirit	3
Cintel C Reality HD / 2K	4
Thomson Spirit HD / 2K	3
Others. Please specify	1

(Others: Thomson Shadow 1)

Restoration Equipment

Type of system	Number
Archangel	2
MTI Correct	4
DaVinci Restor	0
DIAMANT	6
Digital Vision DVNR	15
Others. Please specify	7

(Others: Retouche (prop.), Edifis Scratchbox, Teranex 1, Thomson VS4, in-house computer aided repair system)

10. Appendix 3

10.1 Preservation Needs

3=Highest Rating

Broadcast Archives

10 of 16 archives reporting

Preservation Priority Rating: Film	
2,3	16mm SEP MAG
1,8	16mm reversal (all)
1,3	16mm negative
1,0	35mm negative
0,7	35mm print
0,5	35mm SEP MAG
0,3	16mm print
0,0	16mm reversal edited with cellophane tape

11 of 16 archives reporting

Preservation Priority Rating: Video	
1,9	¾" Umatic H PAL
1,4	¾" Umatic LB PAL
1,3	1 inch C PAL
1,3	1 inch B PAL
1,0	¾" UmaticLB SECAM
0,7	2inch PAL
0,6	BETACAM SP
0,6	D3
0,6	¾" Umatic H SECAM
0,6	¾" Umatic SP PAL
0,6	¾" Umatic (other standard, eg NTSC)
0,4	2 inch B/W
0,3	½ inch BETACAM
0,1	½ inch MII
0,1	VHS

7 of 16 archives reporting

Preservation Priority Rating: Audio	
2,3	¼ inch tapes
0,9	Others. Please specify
0,7	DAT
0,6	CD
0,4	Shellac
0,4	LP vinyl
0,1	Cassettes
0,0	Wax cylinders
0,0	78 RPM vinyl
0,0	Minidisc
	Other: direct cut discs, Tandberg QIC

11. Appendix 4

11.1 Operators and Transfer Data

9 of 17 archives responding

	Film	Video	Audio tape	Disks
Avg no. of transfers per week	21,0	74,8	85,0	72,5
Avg no. of transfers per operator per hour	0,9	2,8	1,7	1,5

15 of 17 archives responding

	Film	Video	Audio tape	Disks
One operator one transfer	8	7	8	3
One operator multiple simultaneous transfers	1	6	4	1

12. Appendix 5

12.1 Preservation Needs

1) Automation of Preservation Processes

Interest was expressed for (in order of greatest to least interest): minimal supervision; high level of quality monitoring; robust devices to limit failures.

Broadcast Archives (100=highest rating)

16 of 17 archives responding

94	Minimal supervision
91	Quality monitoring
88	Robustness in playback

2) Tape Condition Assessment

In addition, when asked what they needed information about in particular, their first choice was information concerning checking material before playback (and to aid in selecting material conducive to automated processes). Their second choice was for information on detecting materials needing urgent transfer and third, information on monitoring tape storage.

When asked to indicate what they (Service Providers) are most interested in knowing more about, the first is information on the selection of the most urgent material to transfer. This is followed by tapes storage monitoring and lastly, information on checking before playback.

Broadcast Archives

16 of 17 archives responding

87	Checking before playback
80	Selection of most urgent material to transfer
77	Tapes storage monitoring

Service Providers

8 of 9 responding

100	Selection of most urgent material to transfer
81	Tapes storage monitoring
75	Checking before playback

3) Media Requiring Most Effort (5=highest score)

Concerning which media needs to be focussed on first, opinions concern more than one medium; however, broadcast archives believe automation efforts should first focus on film and SepMag (due to the expense) and open reel video (due to equipment obsolescence and media fragility).

Service Providers related little experience in current automated processes. In their opinion, automation efforts should focus on film reels and open reel video since they are in high demand and physical degradation is more critical.

Broadcast Archives

14 of 17 archives responding

4	Audio – SEPMAG
4	Open reels video
3	Films reels
3	Audio- open reels
2	Disks

Service Providers

5 of 9 responding

5	Films reels
3	Open reels video
3	Audio – SEPMAG
3	Audio- open reels
2	Disks

13. Appendix 6

13.1 Storage Solutions & Costs

Broadcast and film archives [as well as Service Providers] were asked to identify the kind of information they need concerning storage solutions and costs in order to develop a sound preservation plan.

Broadcast Archives

16 of 17 archives responding

97	Efficient migration from one storage technology to the next
91	Storage media
91	Storage systems
91	Longevity of storage media and systems
88	Security of storage media and systems
84	Technology Advances
84	Costs
78	Suppliers
75	Storage capacities

Film Archives

5 of 5 archives responding

100	Suppliers
100	Security of storage media and systems
100	Longevity of storage media and systems
100	Technology advances
100	Efficient migration from one storage technology to the next
90	Storage media
90	Storage systems
90	Storage capacities

Service Providers

7 of 9 responding

100	Longevity of storage media and systems
100	Efficient migration from one storage technology to the next
93	Security of storage media and systems
93	Technology advances
93	Costs
71	Storage media
71	Storage systems
71	Suppliers
71	Storage capacities

14. Appendix 7

14.1 Current Collection Users

Broadcasting Archives

14 of 17 archives responding

Users	
Broadcaster(s)	303.590
Producers	131.003
Others	80.290
Private persons	15.088
Researchers	10.670
Other cultural institutions	4.360
Other archives	2.609
Museums/exhibitors	832
(Film)festivals or theatrical use	767
Total	549.209

Others includes total users by those archives who couldn't differentiate between types and students

Film Archives

5 of 5 archives responding

Type of user	No per year
General public to film screenings	496.000
Broadcaster(s)	2.650
Producers	165
Researchers/students	9.620
Other archives	144
Other cultural institutions	197
Museums/exhibitors	60
(Film)festivals or theatrical use	145
Private persons	1.220
Others	800
Total	511.000

Others was not specified

Service Providers

4 of 8 responding

Type of user	No per year
Broadcaster(s)	25
Producers	139
Researchers	1
Archives	31
Other cultural institutions	15
Museums/exhibitors	10
(Film)festivals or theatrical use	3
Private persons	58
Others. Please specify	1610
Total	1892

Others includes one service provider's online registered customers

Note: not all survey participants could differentiate between types and just indicated with an "x" which user groups they serve. This information was taken into account in the report summary.

15. Appendix 8

15.1 Questionnaire Methodology

In order to facilitate data analysis and comparison, all survey responses were entered into Excel. Questions asking respondents to prioritise, or to rank interest/services/tools were analysed by attributing points and ranking the answers according to the resulting score. Questions requiring a description of something (experiences, advice, requirements, processes) were summarised by the relevant Work Area leaders.

Rating and Scoring Methodology

Type 1

Really need urgently=100

Not at all=1

In-between=50

$RU+NAA+IB / \text{Max \# of votes} = \text{score}$

Type of Support Tool	Really need this urgently	Not at all interested	In-between		Score
Documentation platform	2	0	6	$2 \times 100 + 6 \times 50 / 8$	62.5
Publication platform	0	2	6	$2 \times 1 + 6 \times 50 / 8$	37.7
Turnkey system	2	3	1	$2 \times 100 + 3 \times 1 + 1 \times 50 / 8$	31.6
Export system	3	1	3	$3 \times 100 + 1 \times 1 + 3 \times 50 / 8$	56.3

Type 2

Up to Date=50

Want to know more=100

Irrelevant=1

$UD+WM+IR/\text{max \# of votes} = \text{score}$

Information about :	I'm up to date	I want to know more	Irrelevant		Score
Storage media	2	8	0	$2 \times 50 + 8 \times 100 / 10$	90
Storage systems	2	8	0	Same	90
Suppliers	2	7	0	$2 \times 50 + 7 \times 100 / 10$	80

Type 3	Type 4	Type 5
Priority 1-3	Priority 1-4	Priority 1-5
1=3	1=4	1=5
2=2	2=3	2=4
3=1	3=2	3=3
	4=1	4=2
		5=1

Total multiplied by number of votes/max # of votes