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Audiovisual Media Preservation**

D2.5: CoP PROGRESS REPORT YEAR 2

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1 Scope and Executive summary

Since the nine Communities of Practice have been created in year 1, a large part of the work in Presto4U during year 2 consisted of directing, facilitating, stimulating and maintaining interactions and feedback for providing detail on the preservation needs of each Community. This part of the project also gathered data about the various communities, providing — mostly qualitative — analyses of gaps and challenges, identifying relations with the supply-side, and delivering feedback to the project for many of the challenges of each CoP.

This second CoP Progress Report is a collated report describing the individual progress for each Community of Practice in year 2. Each chapter was written by the respective Community of Practice leader and responsible partner in the project.

Many of the findings and recommendations in the task have been taken into account in other work of Presto4U and in the further strategies for the audiovisual preservation domain as documented in WP6.



Image from a meeting hosted by the Video Art Community of Practice July 2014

2 Learning and Teaching Repositories

2.1 *Introduction to the work done, general challenges and progress*

For the past decade Further (FE) and Higher (HE) Education institutions have been driven by the need to develop e-strategies and harness virtual learning technologies to increase productivity and enhance education. This has resulted in the increase of audiovisual content utilised to complement the traditional classroom teaching or produced to deliver distance-learning courses. In most cases efforts have been concentrated on the immediate access to content in the form of recorded lectures, podcasts and video conferences made available on web channels like YouTube, iTunes U, Vimeo or through virtual learning environments like Moodle. Despite the increase of born-digital content little attention has been dedicated to the long-term access of audiovisual resources because digital preservation is not considered an area of focus in the context of broader institutional strategies.

Alongside the increase of born-digital content, many analogue collections held at European universities as a result of donations or research studies are at risk of deterioration¹. Digitisation efforts are often restricted to short-term project funding and the identification of potential benefits vs costs for a sustainable approach to institutional preservation remains often unexplored. On the other hand digital preservation has gathered more interest in the academic field and Digital Humanities Research is offering new insight into the challenges and solutions available to the archival community.

Learning and Teaching Repositories are currently a sporadic reality often spun from evolved digital practices in university libraries or prompted by collaborations with joint information system initiatives and preservation actions like those pursued by Jisc² in the UK.

Learning and Teaching Repositories have the potential to become a major business driver for FE and HE institutions across Europe, however this is highly dependent on the development and implementation of institutional preservation policies and more effort is needed to raise digital preservation awareness.

Although good digital preservation practices are emerging in this field, there are still limited funds and human resources available, as well as a lack of skilled practitioners.

That is why sharing of experiences and expertise play an important role in the progression of this Community, which is only just emerging.

The work of the Community of Practice (CoP) for Learning and Teaching Repositories identified within Presto4U has been primarily directed towards the creation of an opportunity for networking and knowledge sharing in the university sector. Activities started in 2013 with the establishment of a CoP expert working group as a strategic resource for the identification of digital preservation practices in the academic field, including the use of technology, adoption of standards as well as documentation of outstanding needs. We defined the CoP's objectives in alignment with Presto4U's strategic purpose to raise digital preservation awareness and improve the adoption of best practices and useful results of research.

¹ 2012 Survey on the Situation of Audiovisual Media in European Higher Education Institutions, Andy

² Formerly *Joint Information Systems Committee*, JISC is a non-departmental public body that promotes the innovative application and use of *information* systems and *information* technology in further and higher education in the United Kingdom. <http://www.jisc.ac.uk/>

To support the process of knowledge creation and transfer we set off to identify a group of academic professionals who had been involved in the digital preservation of audiovisual material and were willing to collaborate with Presto4U through dialogue, feedback and the sharing of documentation. The so called 'core expert group' was selected after an extensive search to define the largest possible number of European higher education institutions with different size and geographic spread.

Finding universities with audiovisual collections was not an easy task, mostly because in the majority of cases, this type of resources represented a small part of the university repository, or sat within a specific department, which didn't necessarily have visibility outside the institution.

Language barrier was also an obstacle in the search and recruitment of core experts; however we were able to secure the participation of 10 community members.

Name	Position	Institution	Country
Eva Binder Guenter Muehlberger	Research Associate Senior Project manager	University of Innsbruck	Austria
Ine van Dooren Nicholas Clark	Archivist Production and Preservation Manager	University of Brighton, Screen Archive South East	United Kingdom
Antonella Scarpa	Audiovisual Librarian	IUAV University of Venice	Italy
Helen Guerin	Director of Media Services	University College Dublin	Ireland
Mariella Guercio	Professor of Archival Science, Coordinator of research for digital archives and repositories at Digilab	Sapienza University, Digilab	Italy
Ruth Cammies	University Archivist	The Open University	United Kingdom
Sandra Collins	Director Digital Repositories of Ireland	Royal Irish Academy, Digital Repository of Ireland	Ireland
Angel Mancebo Muñoz	Technical Director CEMAV	Universidad Nacional de Educación a Distancia, CEMAV	Spain

Exhibit 1 Participants in the 'core expert group' for Learning and Teaching Repositories

Other AV professionals working in higher education were invited to join in 2014, but agreed to acquire a less active role and receive newsletters instead (e.g. Learning Lab - Technical University of Denmark).

The work in year 2 was mostly focused on strengthening the knowledge exchange activities between core experts and with other work packages. We used the baseline of information gathered through an online questionnaire in year 1 to investigate further into the digital preservation needs and requirements of the community members.

We also intensified the online discussions with core experts and increased the dissemination activities to raise awareness and reach out to the wider community.

One of the main achievements in 2014 was the workshop organised primarily for the research and education communities³ (Venice, 6-7 November 2014). This free 2 half-day training and networking event offered the two emerging communities an opportunity to learn more about challenges, methodologies and case studies related to the digital preservation of audiovisual media in education and research. Among the themes covered were best practice for digitisation and video master formats, the importance of standards adoption, EU copyright law, metadata delivery and a practical example of open source technology. The workshop managed to attract the attention of more than 30 attendees from across Europe and highlighted the need for more knowledge sharing in these domains. It also offered an opportunity to present the recently launched Market Place (D4.7) and invite participants to join the Community of Practice on PrestoCentre.

2.1.1 Community management

The core expert group activities have been directed by a Community leader who has been responsible for the setting up and administering of meetings, encouraging discussions, collecting information and facilitating knowledge transfer activities to- and from- other work packages⁴.

The group was initially introduced to the project objectives and given free PrestoCentre membership with access to all services including the community space on www.prestocentre.org⁵. They have also been assigned an internal community work space in Google+, which has been used throughout the duration of the project to share updates, work jointly on documents, and send reminders for events and virtual meetings. The community building process and discussions topics have been documented in Excel and Word documents including meeting minutes, which have been stored in Google Drive.

The group discussions have taken place on Skype due to the institutional restrictions imposed for some members on the use of the Google Community voice call services (Google Hangout). The core expert group was initially invited to share some general information on their role and audiovisual collections. The introduction was followed by a preliminary discussion on the main areas of challenges experienced by the community members. Subsequent meetings have taken place every 2-3 weeks using the Doodle Poll functionality to gather availability of members.

Some of the key discussions have touched issues around the application of metadata standards, rights management, sourcing technology and the relation with IT departments.

³ “Future-proof AV content for Education and Research”, IUAV University of Venice (6th November) and RAI Veneto (7th November), Venice – Italy, 2014, <https://www.prestocentre.org/calendar/future-proof-av-content-education-and-research>

⁴ Presto4U Work Packages: <https://www.prestocentre.org/4u/work-packages>

⁵ Community space on PrestoCentre: <https://www.prestocentre.org/communities/learning-and-teaching-repositories-community-practice>

2.1.2 Data Collection

The Core expert group has played a key role in the data gathering exercise and they have actively participated in writing tasks and telephone interviews.

The information shared during the virtual meetings has been reported in the minutes and complemented by the use of templates distributed across the 9 communities of Practice to ensure consistency in the data collection. This included a template to collect examples on commonly used file formats and another for a case study on standards adoption.

Core experts were also invited to complete an extensive questionnaire⁶ to gather a baseline of data on the current state of digital preservation in higher education. The questionnaire was drafted by King's College London (KCL) following the knowledge schema developed under task 2.1⁷. We used the OAIS functional model and vocabulary as a reference to define the chapters and key areas of investigation. The questionnaire captured information on organisation demographics, digitisation plans, use of technology, adoption of standards, and provided a preliminary overview on the community's digital preservation needs and barriers. The questionnaire was presented with a protected password on the PrestoCentre platform and offered users the ability to save a 'draft' version. It also used skip logic rules to facilitate a more rapid completion and included specific questions aimed at the Learning and Teaching community. The questionnaire has been also represented in Excel format for off-line browsing and use.

Questionnaire Learning and Teaching Repositories

Home » Questionnaire Learning and Teaching Repositories

Thank you for taking the time to complete this questionnaire. If you have a PrestoCentre account you should login first to be able to save your answers in between and continue later on. Don't have an online account yet, register [here](#).

Archival Storage

6.1 Do you have long-term storage?

No

6.2 If not, what is preventing you from buying one?

Funding issues x

6.3 Are you aware of any technology that could satisfy this need?

No

6.4 What would be the requirements for archival storage technology within your organisation?

File storage x File restore x Configurable ingest x File search x Integrity check x

6.5 Is there any specific dataset on which the need for software arise?

Add as many details as possible (e.g. name collection, format, compression, frame rate, sampling rate)

Exhibit 2 Example of one of the areas covered by the online questionnaire on www.prestocentre.org

⁶ Online questionnaire: <https://www.prestocentre.org/questionnaire-learning-and-teaching-repositories>

⁷ D2.1 CoP Knowledge Schema, Deliverable_D2.1_presto4u_10_07_2013 V2%28R%29_lores

As the project progressed we also invited community members to fill in the new ‘needs gathering’ form developed within the members profile section on www.prestocentre.org to capture digital preservation needs and requirements. As explained in the chapter ‘Making connection with suppliers’ the ‘add a need’ web-form sits within the wider Market Place concept, which aims at guiding CoP members in their search for community-adopted solutions.

2.1.3 Dissemination

A detailed communication plan has been presented within WP5 for the community space on prestocentre.org as the first point of reference for all the communications related to Learning and Teaching Repositories. Within this area we uploaded videos, updates and publications. As the core expert group activities kicked off we started to distribute regular newsletters to those who had decided not joined the project, but wanted to follow progress closely. As the project developed we extended distribution to members who had sign up on the PrestoCentre community space. In 2014 we have also published some blog posts⁸ with the purpose of reaching the wider community and raising digital preservation awareness at a broader level.

We also decided to join collaboration with bigger organisations such as the DPC⁹ and BUFVC¹⁰ in the UK to extend dissemination of project outcomes and inform a wider audience on upcoming workshops. BUFVC also offered us the opportunity to publish an article in both print and online versions of ViewFinder magazine¹¹.

KCL also engaged with internal stakeholders and presented the community at the quarterly meeting held by EIGER (King’s Educational Interest Group for e-Learning and Research¹²). We also secured participation at King’s College London 8th Excellence in Teaching Conference¹³ and presented a poster¹⁴ on the Presto4U project and the importance of preserving audiovisual material in higher education.

The campaign to raise digital preservation awareness was also extended through the use of social media (Twitter, LinkedIn). We also reached out to the European network in the frame of the Lifelong Learning Program with an article entitled ‘The future of audiovisual learning resources’¹⁵, which was published on the online magazine InfoNet.

⁸ Learning and Teaching Repositories Blog <https://www.prestocentre.org/blog/653>

⁹ Digital Preservation Coalition (DPC) is a not-for-profit membership organisation that aims to secure the preservation of digital resources in the UK and to work with others internationally to secure our global digital memory and knowledge base. <http://www.dpconline.org/>

¹⁰ British Universities Film and Video Council

¹¹ Ligios, L., Colbron, K. “The Standard of Digital Preservation”, ViewFinder No 95, June 2014, <http://bufvc.ac.uk/articles/preserving-audiovisual-content-in-education>

¹² EIGER group at King’s College London: <http://www.kcl.ac.uk/study/learningteaching/e-learning/eiger/index.aspx>

¹³ 8th Excellence in Teaching Conference, King’s College London, 16 June 2014: <http://www.kcl.ac.uk/study/learningteaching/kli/conferences/eitc/2014/8th-Excellence-in-Teaching-Conference.aspx>

¹⁴ Poster presented at 8th Excellence in Teaching conference, “The importance of preserving AV material for learning and teaching”: https://www.prestocentre.org/files/poster_v6.pdf

¹⁵ Ligios, L. “The future of audiovisual learning resources”, InfoNet, 29 July 2014, <http://www.infonet-ae.eu/articles-projects-49/2187-the-future-of-audiovisual-learning-resources>

Another important channel for dissemination was presented by the workshop organised within Presto4U. In 2013 we presented the Learning and Teaching Repositories Community of Practice at the workshop¹⁶ organised at the Institut National de l'Audiovisuel (INA). During the event we gathered in three different working groups and offered participants the opportunity to share their digital preservation challenges.

Further face-to-face meeting and dissemination opportunities in year 2 included the JISC Digital Festival 2014¹⁷ (Birmingham, UK) and the Preservation on storage solutions¹⁸ which was held at RAI in Turin, Italy on the 25-26 June 2014.

In year 2 we also planned a webinar on PREMIS metadata to offer the wider community an opportunity to learn more about its purpose and practical use cases. Although the webinar was planned for November 2014 with guest speakers lined up with presentations, B&G/PrestoCentre were unable to host it due to lack of staff resources. They hope to run the webinar in 2015 following the wider plan to continue webinars after the project. The webinar will provide some answers to the following questions:

- What is the purpose of preservation metadata?
- What typical preservation metadata semantic units are needed and why?
- What is special about A/V metadata?
- What are the use cases?
- What are examples for: A/V characteristics, relationships, events, environments, preservation metadata extraction tools?

2.1.4 Widening participation

Another major opportunity for dissemination as well as widening participation was presented by the workshop KCL organised specifically for the education and research communities¹⁹.

The core expert group strongly felt that major digital preservation events were catered primarily for the broadcasting community (e.g. FIAT/IFTA) or large film archives, so we decided to offer smaller collections and emerging communities an opportunity for learning and networking.

We promoted the event via newsletters, Twitter and using the online platform of PrestoCentre, DCP, UNINFO²⁰, BUFVC, DARIAH²¹ among others.

¹⁶ 'Digital Audiovisual Preservation in Communities of Practice: Learn, Collaborate and Share' INA, Paris, 4 December 2013, <https://www.prestocentre.org/presto4u-workshop-2013>

¹⁷ Jisc Digital Festival, 11-12 March 2014, Birmingham, United Kingdom: <http://www.jisc.ac.uk/events/jisc-digital-festival-2014-11-mar-2014>

¹⁸ Preservation: Audiovisual Preservation Storage Solutions: <https://www.prestocentre.org/events/preservathon/storage-2014>

¹⁹ Future-Proof AV content for education and research, 6-7 November 2014, Venice, Italy: <https://www.prestocentre.org/calendar/future-proof-av-content-education-and-research>

²⁰ Presto4U workshop promoted online by UNINFO: <http://www.uninfo.it/index.php/news/eventi/item/uninfo-segnala-future-proof-av-content-for-education-and-research-venezia-6-7-novembre>

²¹ Presto4U workshop promoted online by the Digital Research Infrastructure for the Arts and Humanities: [http://www.dariah.eu/news/calls/details.html?tx_news_pi1\[news\]=181&tx_news_pi1\[controller\]=News&tx_news_pi1\[action\]=detail&cHash=9b685d221257246c7600fa53402f3432](http://www.dariah.eu/news/calls/details.html?tx_news_pi1[news]=181&tx_news_pi1[controller]=News&tx_news_pi1[action]=detail&cHash=9b685d221257246c7600fa53402f3432)



Exhibit 3 Examples of promotion for the Presto4U workshop aimed at education and research on Twitter

The 2 half-day event took place in Venice and was open to professionals highly interested or directly involved in digital preservation activities in the fields of education and research. It was hosted at two different venues: by IUAV University of Venice who joined Learning and Teaching Repositories as core experts (day 1), and on day 2 by the regional department of RAI who are also project partners.



Exhibit 4 Participants of the Venice workshop at IUAV and RAI

The 2 half-day event took place in Venice and was open to audiovisual professionals highly interested or directly involved in digital preservation activities in the fields of education and research. The event proved very successful with over 30 attendees from various institutions in Italy, Sweden, Ireland and the United Kingdom.

The event was designed to cater for different levels of expertise and included a balanced mix of presentations on digital preservation best practices, case studies and discussions. Among the themes covered were: digitisation and video master formats; audiovisual standards and the importance of adoption; EU copyright law; metadata delivery and a practical example of open source technology. The workshop managed to attract the attention of more than 30 attendees from across Europe and highlighted the need for more knowledge sharing in these domains. It also offered an opportunity to present the recently launched 'Market Place' and invite participant to join the Communities of Practice on PrestoCentre. The event was covered by Italian broadcaster RAI in the local news of TG Veneto²².

Other events, such as the AMIA (Association of Moving Image Archivists) Conference and ANADP II (Aligning National Approaches to Digital Preservation), have been attended by KCL representatives to engage with the wider community and distribute the Community of Practice flyers.

²² TG Veneto news (minute 17:32) <http://www.rai.tv/dl/RaiTV/programmi/media/ContentItem-408dc5c5-6bf5-4e3d-a683-7b31e701f995-tgr.html#p=0>

2.2 *The Community's long term digital preservation needs*

2.2.1 Raising awareness

Learning and Teaching Repositories for audiovisual resources have only recently started to form in the further and higher education domain and the majority of institutions are still at a beginner level when it comes to long-term digital preservation and access to content.

Despite the increased awareness and growing research in the field of digital preservation in the academic sector, more action is needed to educate major stakeholders on what is digital preservation and what benefits it can give. This includes higher management who have the power to approve institutional policies and release funds, creator of content who can be advised on the delivery of suitable formats and metadata, teachers who can help identifying the value of resources and IT departments who can advise and make decisions on the most cost effective technological solution for the storage, documentation, management and long-term access to resources.

Need 1: Educate various stakeholders on what is digital preservation and how the institution can benefit from it.

2.2.2 Promoting knowledge sharing

The needs of this community also lie primarily in the better understanding of how preservation and access shall be organised in this sector, so there is a great demand for sharing of knowledge and expertise.

Sharing evidence of use can help build best practices and might create opportunities for collaboration across institutions. An example of this is the AIMS²³ Project (2009-2011), which was developed to define good practice in terms of broader archival tasks and objectives necessary for success in the higher education domain. It stemmed from a collaboration among institutions in both the United States and the United Kingdom: the University of Virginia, Stanford University, Yale University, and the University of Hull (UK). The framework, as defined in the AIMS White Paper²⁴, offers a practical approach presenting a series of case studies. It also created the opportunity for preserving and making discoverable thirteen born-digital collections via Hydra²⁵, a Fedora²⁶-based solution, which was installed and implemented by various institutions.

Although there is no single solution for many of the issues that institutions face when dealing with born-digital collections, sharing expertise can help the community better identify the steps to take towards a digital strategy that is in line with the objectives and potentials of wider institutional policy for information management.

Need 2: Promote knowledge sharing for the definition of best practices

²³ Born Digital Collections: An Inter-Institutional Model for Stewardship (2009-2011):

<http://www.digitalcurationsservices.org/aims/>

²⁴ AIMS White Paper: <http://www.digitalcurationsservices.org/aims/white-paper/>

²⁵ Hydra: <http://projecthydra.org/>

²⁶ Fedora: <http://www.fedora-commons.org/>

2.2.3 Building a business case

Long-term preservation requires sustainable funding and this is an area that FE and HE institutions education struggle with because of tighter budgets and the lack of clear cost-benefit justification for digital preservation programmes.

Investment in digital preservation is often not justified unless there is a viable financial return, hence the better position of some distance-learning universities like The Open University²⁷ when it comes to the implementation of digital workflows and functional repositories. In smaller institutions preservation is often done as a matter of goodwill and limited to the storage of digital files.

In the core expert group we have been able to observe quite a diverse maturity level and start-up scenarios. In some fortunate cases preservation was initiated because of short-term funding available for the digitisation of analogue material or supported by EU research initiatives such as PrestoPRIME²⁸ for the implementation of open-source preservation platform P4²⁹ at the University of Innsbruck. In other cases digital preservation practices have evolved within the university library taking advantage of funding available for a wider strategy for electronic access (e.g. 'Videoteca'³⁰ at IUAV University of Venice), or collaborations from the Arts & Humanities faculty with other departments including information technology, computer science and computer engineering among others (e.g. Digilab³¹ at Sapienza University).

The ability to build a strong business cases and get management buy-in from a larger group of stakeholders are key to the development of an institutional policy that can make digital preservation one of its core businesses. With an evolving student-base that greatly relies on a more dynamic and multimedia learning experience the preservation and access to audiovisual resources could play a key role in supporting and delivering more successful recruitment strategies.

Need 3: More guidance is needed to help practitioners building a business case and secure funding

²⁷ The Open University, <http://www.open.ac.uk/>

²⁸ PrestoPRIME, <http://www.prestoprime.org/>

²⁹ Preservation Platform P4, <https://github.com/prestoprime/p4>

³⁰ Videoteca is Italian for video library. IUAV, University of Venice has a significant collection of audiovisual material on architecture and planning, design, arts and theatre (approximately 2,400 videos made in Italy and abroad). It also preserves video recordings of conferences, seminars and lessons that have been held at the university since the 1980s. <http://iuavbc.iuav.it/sbda/main.php?section=343>

³¹ Digilab is a department at Sapienza University responsible for sapienza Digital Library and various activities of research and development. <http://digilab.uniroma1.it/centro/chi-siamo>

2.2.4 Training in digital preservation

Whilst universities have a longer tradition of dealing with the preservation of records in paper and electronic form, audiovisual media are a relatively new venture and a trend that is likely to increase especially with the raising pressure for technology enhanced education. More and more institutions are setting up departments often called 'Media Services' or 'Central Unit for Distance Learning' with a team of photographers, videographers and AV specialists responsible for the creation of digital content. Whether the curation and preservation of resources falls within the responsibility of the university library or a dedicated team of archivists and technicians, more training in digital preservation is needed to educate practitioners on best practices, including choice of video master formats, use of metadata standards, rights management, access and migration.

Need 4: More training is needed to support the work of content creators and archivists

2.2.5 Affordable technology and economies of scale

Currently there is a prevalence of use of open source technology within the learning and teaching sector due to the perception that this technology is cheaper than using a third party vendor or an off the shelf solution. However this is often not the case as open source can result in both large licence fees annually, but also creates the reliance on in house developers who can be difficult to both recruit and maintain in development roles. It can also mean that there is not the resource in house to allow the chosen technical solution to grow and change as technology evolves. However third party solutions can be costly, or built for only part of the solution required to enable digital preservation, making the choice for universities extremely difficult. There could however be an opportunity using the economies of scale theory, where similar institutions with similar requirements could either approach vendors to offer a more attractive customer prospect, or even to think about setting up a shared development department for the building and maintenance of an open source technical solution.

Need 5: Better understanding of available technology and requirements across various institutions to lower costs by reaching economies of scale

2.2.6 Hardware and software

A deeper investigation into the technological needs of the community of archivists in the higher education domain has been carried out through telephone interviews and the use of a questionnaire³², which followed the core schema developed during the first stage of the project³³ to define the level of information required across all communities. Mapping the questionnaire to the knowledge schema has allowed a more consistent and unified gathering of a baseline of information and an opportunity to test the community's understanding of the terminology more commonly used in the world of audiovisual archiving. In particular we referred to the OAIS model and the broad range of digital preservation functions including ingest, access, archival storage, preservation planning, data management and administration.

Overall the community has a general idea of the audiovisual lifecycle but a narrower interpretation of digital preservation functions, targeting primarily storage, cataloguing and immediate access of resources.

Automation is highly needed in the higher education sector because staff resources are limited and practitioners do not have sufficient time to carry out manual input of data and a more in-depth management of digital assets.

In particular the community would find useful software tools for producing automatically the technical **metadata** during the digitisation process, as well as technology able to capture bibliographic metadata from legacy databases primarily used for cataloguing print materials (books, journals) and analogue carriers (VHSs, DVDs, audio cassettes etc.).

Descriptive and administrative metadata are really important within this field to facilitate search and manage access to content. Cost-effective tools capable of providing automatic scene detection and time code metadata would be highly beneficial for the academic community.

Archivists in this field are also looking for tools and standards with the ability to ensure the presence of different vocabularies and cross-references for describing objects without losing the domain point of view. Audiovisual content in the higher education domain tend to cover a wide variety of disciplines and linked-data is also needed to capture associated content (e.g. power points, images, animations etc.) especially for e-learning packages.

Participation with other archives/projects often brings to the foreground variations in the processing of metadata therefore interoperability is an essential aspect of technology within this field.

The community also needs a centralised system for **storage** with the ability to handle assets in a highly secure IT-environment.

Tighter budgets and pressure to achieve better value for money in data storage are pushing universities towards more attractive cloud-based storage solutions. However this type of technology brings potential information security risks associated with storing content externally and especially high concerns around data protection and legal obligations relating to third party rights.

³² Online questionnaire used by the core expert group in the Learning and Teaching Repositories CoP: <https://www.prestocentre.org/questionnaire-learning-and-teaching-repositories>

³³ D2.1 CoP Knowledge schema (M6)

The community needs to be aware that generic providers of cloud services, such as Amazon, Google and Microsoft, do not typically address specific archival considerations within their basic offerings, and should perform a deeper investigation into available technology and value-added services for long-term storage.

Quality control is not currently considered an area of priority in the educational domain and practitioners generally trust the technology to give them the quality required. However they could highly benefit from packaging tools with integrated validation software to confirm files ingested are uncorrupted and complete.

Another important area of need is **rights management**. Technology in this area could help administering access to content according to different types of rights owners and the type of material (e.g. cinema vs video conferences).

The focus on **access** to resources is pushing universities to publish content online using services such as YouTube, iTunes U, Vimeo. In some cases there is a perception that these platforms can also act as storage of content. The community needs affordable solutions capable of storing separately the preservation format and create renditions for playing and streaming over web and mobile devices.

In general most audiovisual practitioners in higher education have very little awareness of technology available, nor do they have sufficient knowledge to calculate costs of preservation and make compelling business cases, therefore more opportunities for training are needed to empower the community.

2.3 Barriers to the Community's adoption of new technology

The barriers to technology adoption will vary depending upon such things as size of institution, financial constraints or lack of information, education or expertise.

There is an assumption that large institutions will have more money and resources available for digital preservation, however this is often not the case as budgets for these universities may well be stretched over many more departments, with preservation of audiovisual materials falling to the bottom of the list of priorities or institutional strategies.

It is also difficult for large institutions to have a cohesive preservation strategy that can manage with the volume of audiovisual assets produced by departments that are both disconnected or fragmented from each other. The cost of a large technology solution in terms of either in house development or off the shelf products could be prohibitive when trying to manage multiple requirements over multiple areas.

For smaller institutions the issue may not be as cost based in terms of purchasing technology but more in terms of resource to manage a digital preservation project that falls beyond their day to day remits. Their workload in terms of business as usual may be so great in terms of resources and delivery timeframes that anything thought to be 'additional' to this work is immediately dismissed as frivolous and unnecessary if it not built into the workflow of digital material production.

Smaller institution will often try and opt for an open source technical solution in the hope this will prove a cost saving exercise. This may well provide them with a cheaper technical solution, however the pitfalls may be that they then have a reliance on a single developer within their team to build and maintain their solution, running the risk of having a single point of failure if this developer should no longer be available. This may leave the solution chosen either half finished, or built but never expanded or upgraded as the source knowledge around the solution has left.

Another barrier is a lack of awareness, which means senior management buy-in to create a digital preservation policy and standards for all departments to follow can be a crucial missing piece to enabling preservation. When trying to implement a preservation plan stakeholder management throughout the institution is crucial. Unfortunately often communication from those who are driving the need for audiovisual preservation is not escalated to those who have the power to impose the change required, or who are the budget holders.

Executive level buy in will be crucial to the success of a preservation plan, but equally those who are responsible for facilitating the plan must also take the time to educate those digital content creators within the institution that digital preservation should be utmost in their minds once they have created their video. However currently preservation plans for the learning and teaching community are rare, meaning the senior stakeholders have little compelling evidence to force them to impose the creation of such a plan.

Preservation plans should also educate senior stakeholders that the term 'audiovisual preservation' does not always mean preservation of absolutely everything the university produces. The plan could factor in time scales of keeping material and should be measured against the resources that the university has within their grasp. Understanding this can make the appetite to preserve audiovisual material greater from the budget holders' point of view as it means they are able to financially scale their costs to meet these needs.

In some institutions the sole responsibility for the purchase or development of technology lies with the central IT department. This department may well have a great understanding of core technology, however they often have little understanding of the core assets or workflow being used by the technology they are dealing with. One would not expect an IT expert to necessarily have knowledge and expertise in either the nuances of audiovisual material or the issues around digital preservation. Without them consulting and working with the librarians, archivists and information managers who both create and work with learning and teaching resources, the IT team may be procuring a technical solution that they believe fits the preservation remit, but does in fact fall wide of the mark. The department which has the requirement for preservation should work closely with the IT department to ensure such an eventuality does not occur.

During the core expert group meetings we have observed that often there is a lack of understanding between the two parts (archivists and IT departments), because the two are using different vocabularies and terminology when describing their requirements and solutions.

Another issue could also be around the tools available to the learning and teaching community for the type of audiovisual assets they are creating. For instance although some of the tools assessed in WP3 could potentially meet the needs of the community for metadata extraction and metadata mapping, many of these tools were focused on file formats which are mainly used in the broadcasting community, such as MXF.

Once the potential technology to allow audiovisual preservation is identified, another issue can be the challenges around integrating new technology with existing system. The tools identified may work well as standalone products, but potentially institutions may have existing parts of the digital preservation plan in place in terms of technology for video or metadata management. If these tools are off the shelf vendor supported systems then the ability to integrate with other systems may be limited.

Also an IT department with a long term strategic plan may not have an appetite to engage in a tight integration piece with other new technologies as this then makes it more difficult to both manage the whole IT infrastructure or architecture, or to swap out parts of an IT solution once technology has progressed into new realms.

However, outside of all of the technical and financial issues there is an overarching lack of information, educational resource, and expertise on audiovisual preservation within the learning and teaching community. This is a community that is new to the concept of preservation and has been thrown into the discussion and issues around the topic due to the increase and prevalence of audio and videos used in teaching, distance learning, MOOCs, podcasts, or collections that have been donated or built over a number of years. This presents a challenge to the librarians and archivists who are then tasked with the job of audiovisual preservation as the majority of information is around broadcasting or the preservation of long form video. These people may have only had to deal with non-digital material in their work and would therefore be seeking out information and use cases which will not be available to them.

All of the above do present significant barriers to non-adoption of preservation plans for audiovisual preservation within the educational environment. Much of this is to do with the costs around buying or building technology, a lack of understanding of standards available and resource issues. However the lack of existing educational resource to help learning and teaching institutions in their decision making process does appear to be a significant issue. This then has an effect in their stakeholder management and gaining buy-in from the executive management teams as they have no tangible evidence to give to support their case. Overcoming these issues prior to choosing technology would open the door to allow much improved communication and progression in terms of audiovisual preservation adoption.

2.4 Connection between the Community and suppliers and vendors

Learning and Teaching Repositories are an emerging market in audiovisual preservation and the increasing costs implied by commercial solutions are often not compatible with the lack of resources. The majority of suppliers seem to cater the world of broadcasting and film-archiving, which tend to have bigger budgets and a more evolving demand for upgrading technology. Many universities are therefore experimenting with their own low cost solutions, mostly based on Fedora and other open source technology as opposed to vendor based solutions.

In general there is a perception that open source software is cheaper to implement and customise, however universities rely strongly on technology providers to offer solutions to enhance education and take forward the e-Learning approach.

During the project we explored technology areas aimed at the higher education community and we observed that the focus is on Technology Enhanced Learning (TEL). This seems to be a fast-growing trend in higher education and responds to the universities remit for innovation and excellence in teaching.

In Europe the longest tradition goes to the Bett show³⁴ established in the United Kingdom in 1985 and now operating internationally with an exhibition and conference in Brazil. Other major events include Education Innovation³⁵ and Learning Technologies³⁶, which run alongside academic conferences like EC-TEL³⁷ confirming the fast-growing market for technology enhanced learning solutions.

In January 2014 we visited the show to meet some of the technology providers catering FE and HE institutions. We observed that, despite the focus being on multimedia solutions to enhance teaching and learning, suppliers are starting to embrace digital preservation as a by-product of their core offering. This is demonstrated by the integration of virtual learning platforms like Moodle, Blackboard, Canvas or Drupal with tools capable to create video libraries³⁸ and manage audiovisual resources enabling access and secure sharing of files. Cloud-base storage solutions are also on the rise with Redstor and Fujitsu as some of the suppliers targeting the world of education.

The field of TEL offers a great opportunity for integrating preservation in the day-to-day production and management of audiovisual material, however the community must be encouraged to engage with these providers to understand the opportunities offered and promote the development of cost effective solutions.

Exhibition and conferences like the Bett show may offer universities a platform for jointly presenting requirements to influence technology offering and drive price down.

Another opportunity for building a link between demand and supply may be offered by the 'Market Place'³⁹, which has been recently developed by the Presto4U as a final set of services for the audiovisual archiving and preservation community.

The 'Market Place' is built upon the existing PrestoCentre online platform⁴⁰ and brings together the Community spaces, the Standards Register, the Tools Catalogue, library resources and the newly built brokerage tool (Presto broker).

³⁴ Bett celebrated its 30th anniversary at the 2014 show at ExCel London, which attracted 35,044 visitors from 113 countries, <http://www.bettshow.com/>

³⁵ Education Innovation conference and exhibition, Manchester (UK), <http://www.educationinnovation.co.uk/>

³⁶ Learning Technologies, Olympia London (UK), <http://www.learningtechnologies.co.uk/>

³⁷ EC-TEL: European Conference for Technology Enhanced Learning: <http://www.ec-tel.eu/index.php?id=681>

³⁸ An example of this is the video platform offered by MediaCore <http://www.mediacore.com/higher-education/>

³⁹ Task 4.3 Brokering technologies to Communities of Practice and Suppliers

⁴⁰ 'Market Place' on PrestoCentre <https://www.prestocentre.org/>

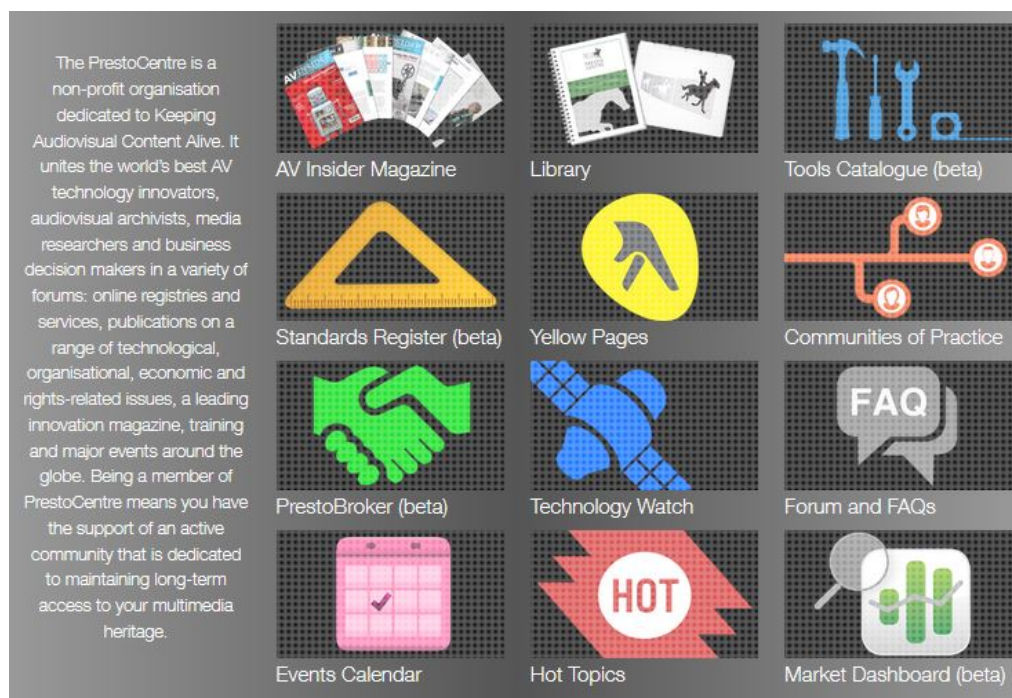


Exhibit 5 Screenshot of 'Market Place' at www.prestocentre.org

The 'Market Place' has the potential to address the need to consolidate demand and help practitioners communicate towards vendors about specific challenges. The site offers members the opportunity to share information on needs and requirements and could provide direction to those who can build solutions and offer services to the community.

Exhibit 6 Needs gathering service on the PrestoCentre website

2.5 Recommendations for the future of the Community

2.5.1 The Community of Practice beyond Presto4U

The Presto4U project has offered the opportunity to bring together audiovisual practitioners from various European universities giving an insight into their challenges, needs and barriers. This is a very important step towards building a growing community of practice in a sector, which has only recently started to implement digital preservation guidelines and requires further guidance and greater knowledge to improve practice.

It is therefore essential that the communication and networking efforts made in the last two years do not end in December 2014 and can continue beyond the project duration to promote knowledge exchange and collaboration.

Although the community of practice has been assigned an online space on prestocentre.org⁴¹, the opportunity for networking and discussion shall be actively encouraged in the future, together with the exchange of expertise across communities.

The online community areas could be reinforced by adding functionalities similar to the ones offered by LinkedIn where users can post updates and connect with other members. The PrestoCentre Answers⁴² section partly covers the need for knowledge exchange, however it does not offer options for direct messaging and could benefit from cloud tagging technology to highlight trending discussions. This could also prompt vendors to join the discussions and further investigate user's needs.

If this is not possible in the short term, the core expert group has suggested the creation of a professional LinkedIn Group for Learning and Teaching Repositories. This could speed up the growth of the community and attract new practitioners who are not currently familiar with the online communities. PrestoCentre could be responsible for account set up and invite joiners who are already subscribing to the CoP newsletter.

2.5.2 The role of PrestoCentre

During the events organised within the project (e.g. Venice workshop) or attended by KCL representatives (4C/DPC Investing in opportunity conference⁴³) we have observed that workshops and face-to-face meetings have a bigger impact on the learning experience and can speed up the process of community building. Webinars organised within Presto4U have also proved very popular and future events could continue to address the learning needs of those who have no travel budgets.

We believe that not-for profit membership organisations like Digital Preservation Coalition (DPC) in the UK or PrestoCentre in the Netherlands, can play a key role in raising awareness, fostering collaboration and advising Government and policy makers on issues that are relevant to the community.

Our strongest recommendation would be for PrestoCentre to continue their work as an advocate for digital preservation in the audiovisual domain supporting the needs of smaller collections by sharing information, showcasing examples of Community-adopted solutions and connecting them with vendors.

2.5.3 Promoting collaboration across EU-funded projects

⁴¹ Learning and Teaching Repositories Communities of Practice on PrestoCentre, <https://www.prestocentre.org/communities/learning-and-teaching-repositories-community-practice>

⁴² PrestoCentre Answers is currently available to paying members on <https://www.prestocentre.org/answers>

⁴³ 'Investing in opportunity' was a two day conference organised by 4C (Collaboration to Clarify the Costs of Curation) Project and the DPC (Digital Preservation Coalition) to explore the long term value and sustainability of digital objects (Welcome Trust, London 17-18 December 2014). <http://www.4cproject.eu/community-resources/investing-in-opportunity-conference>

During the Presto4U project KCL has tried to promote cross collaboration with the 4C⁴⁴ project using the DPC online platform⁴⁵ to reach out to the wider community and inform them on upcoming events. We believe that there may be a stronger opportunity for EU funded projects to maximise their impact by connecting the various stakeholders sharing domain of expertise and bringing the communities together.

We have also observed that it might be also beneficial for EU-funded projects addressing digital preservation issues to have a central online platform making easier for partners to create connections and for communities to be involved.

2.5.4 Making progress in digital preservation

Our recommendations also go to FE and HE institutions who are planning or currently working in the field of audiovisual archiving and want to take digital preservation one step further.

2.5.4.1 Understand the value of resources

Digital preservation does not mean that everything must be kept; however understanding the value of content can help institutions prioritise actions and financially scale costs. Whether audiovisual resources have historical importance or play a key role in the delivering short-term courses, universities should appraise collections and define retention policies. It is also very important to consider cost implications before the decision to proceed with acquisition of collections donated by third parties.

2.5.4.2 Identify and connect to institutional objectives

A digital preservation plan could find justification in existing business drivers such as academic excellence, regulatory compliance or applied technology. It could also be connected to existing policies for library, information and records management. Mapping a digital preservation strategy to a wider institutional policy can ensure buy-in from senior management and have a long-term action plan.

2.5.4.3 Define and share digital preservation policies

Long-term access to learning and teaching resources may be heavily dependent on digital preservation strategies approved at institutional level, so one recommendation would be for higher education institutions to share their policies for consultation online and strengthen the connection between practitioners in this domain.

⁴⁴ Collaboration to Clarify the Cost of Curation, <http://4cproject.eu/>

⁴⁵ <http://www.dpconline.org>

2.5.4.4 Explore potential collaborations with other institutions

There are may be many opportunities for collaboration, which could result in increased knowledge shared or more efficient solutions for discovery and access. It could be as simple as sharing case studies or moving archive content to a network level, which may bring a technical (concentrated development) and economical (scaling up) benefit for universities.

2.5.4.5 Engage with IT departments

Archivists in the education domain often complain of IT departments conversing in different terminology and not capturing their needs. It might be time for the preservation community to step into the world of computer science and learn basic terminology. Communication and engagement with the IT departments from an early stage will pre-empt them making a decision on behalf of the active players without understanding their requirements.

2.5.4.6 Connect with suppliers

Engaging with suppliers from start will help institutions better understand available technology to make more informed decisions and it may also drive new solutions. Exhibition and conferences focused on TEL should also be considered by FE and HE institutions for jointly presenting requirements to influence technology offering and drive price down.

2.5.4.7 Exploit the distance-learning trend

Distance-learning is a big opportunity for taking forward the commitment to preserve educational resources, especially where this results in a return on investment. Audiovisual practitioners could use this as leverage for a business case that can allow them to extend preservation to backlog material.

3 Video Production and Post-Production

3.1 Introduction to the work done, general challenges and progress

The CoP Video- and Post-production is defined as a community of users who share a passion for creating “media for makers” and in the same sense users aim at refining and standardising preservation facilities in order to exchange and reuse assets for new video productions, video products, and deliverables.

The core issues in this community is first of all based on the needs of commercial players, B2B, and the business opportunities in media houses and broadcasters, post-production companies, advertisers and marketing bureaus. Currently, the typical pattern is that there is only a very low degree of interaction between the many different organisations and subnetwork.

The presence and wider use of digital media, digital workflows, and digital media is calling for more evident and cost-efficient roadmaps and sharing of knowledge regarding best practices. There is certain need for more standardised navigation and interaction across technical and geographical borders based on different workflows, legacy issues, cultural rules, and standards.

Especially the need for efficient B2B business cases is quite clear and the community aims therefore to focus more explicitly on transparency, training, accessibility, administrative and financial facilities.

The management of the CoP Video- and Post-Production has been planned and implemented by TV 2 Denmark. TV 2 is a media house, semi-commercial with a huge digital production of video-assets for all purposes – e.g. public service, commercials, infotainment, edutainment, entertainment – aimed at television and web-based outputs. Although TV 2 is a rather young media house (25 years’ experience), the company has obtained large results and a quite substantial turnover based on the development of new business cases and B2B-models.

Through interaction, marketing, and business-based relationships TV 2 has built a strong network and relationship with video-media actors from all over Europe. The actual network has been acting as a platform for attracting more companies to take interest in the Presto4U progress as well as to take part in the contribution of relevant feedback to the project. The feedback has been used to gain overall data and facts about currently used workflows, preservation standards, best practices concerning exchange, handling of legacy issues, barriers and restraints, and needs for developments and emerging standards. It is expected that feedback from actors in the community will continue beyond the framework of Presto4U – e.g. through PrestoCentre activities, blogs, questionnaires etc.

Many different actors have taken part in meetings, communication and workshops arranged by the community-management as well as the project management. Meetings with Core Experts have been held regularly and in year two a wider community has been identified and addressed to extend awareness of the activities in the project as well as their focus on blogs, newsletters, input and output regarding their individual needs for standards and tools in the digital preservation area. It is expected that they will be continue to take part in future activities in the framework of Presto4U or similar - through workshops, preservathons, and webinars.

3.1.1 Output - project plan and core expert group – overview

As a general framework for the work and progress in the community and to clarify the most significant interfaces to other communities involved in the project (to avoid overlapping), the CoP has produced a project plan with specifications of definition and objectives, user categories, stakeholders, business cases, business fields, involvement, plans for organisation, expected outcome, assumptions and constraints, deliverables, success criteria and a preliminary communication plan.

Through an extensive communication effort where many different categories of users from different European counties have been addressed, the CoP has succeeded in gathering a group of ten core experts which represents some of the most representative groups in the community as well as the superior expertise in familiar areas and fields.

Particular focus has been paid to certain groups of actors within the organisations addressed. These groups are: managers, commercial staff, marketing and creative staff who are experienced in organising, promoting and trading video assets. Researchers, librarians, and archivists experienced in preserving, searching and retrieving material.

Legal staff used to work with the administration of copyrights and rights management. Technical staff involved in standards, solutions and progress regarding preservathons systems and content- or assets management systems. All Core Experts has been offered a membership to PrestoCentre where they should be able to obtain useful information about the project, the project management, state of the art in research and to communicate with players from other fields.

The CoP has carefully managed the membership through development of communication tools in terms of the creation of a CoP-specific Google+ workspace for shared information about activities, knowledge about other members, meetings and workshops. Furthermore the CoP-management has produced 10 CoP specific newsletters which have been distributed to all members of the core expert group.

Since November 2013 the CoP-management has arranged 8 meetings. All meetings have been substantial and have been reported to Project management and to the Core Expert group.

Following issues have been discussed and assessed in the cores expert group:

- The questionnaire:
 - Especially the length of the questionnaire and the areas it is focusing on. Will people feel attracted spending time in answering and pay attention to the many answers?
 - The results of the questionnaire. Feedback and discussion of the importance of the different answers. Priorities of the most significant results and needs for further elaboration and standardisation.

- Strengths and weaknesses – opportunities and potential threats regarding realistic opportunity for reaching consensus with the industrial marketplace concerning development and impact of standards and tools needed.
- The focus of tooling: Emphasis on technologies and standards seem to be more extensive compared with focus on conceptual and training matters.
- Metadata: The fact that metadata is given lower priority among a lot of production companies and actors in the community and how it affects the abilities of searching and requesting media files.
- Webinars in 2014: which topics should be further elaborated in order to comply with other webinars within and outside the project framework.
- Training facilities. Exchange of media files – best practices, standards, handling. Remote editing – i.e. solutions for creating more focus on the potential of creating and share metadata and information in community organised networks. Dynamically exchange of media files between different users and communities. Best practices, work cases, and handling of technical as well as administrative solutions.
- A communication plan has been discussed and further elaborated containing plans of Core Expert group meetings, webinars, and workshops to be arranged in 2014.
- A webinar has been discussed and arranged in spring 2014 on the topic of Exchange of preserved video media assets.
- A workshop on digital preservation and state-of-the-art issues in broadcast video archives and in the post-production area has been arranged in autumn 2014. A second face-to-face meeting with the core experts of the Community of Practice was included in the workshop.

3.1.2 Evaluation and assessment of community building process, CoP tools

In order to coordinate efforts and common progress and to meet the standards of the general communication strategies in the consortium, the CoP-management has developed a Presto4U Google+ website as a communication platform to maintain the dialogue and coordinate efforts especially between the core experts and the CoP-management but also between members of the wider community and the CoP-experts.

The discussion about using Google+ instead of other platforms was felt as quite demanding. The reason was that in 2013 Google+ was not disseminated and commonly accepted among many different user groups and professional actors. Several of the CoP-leaders did not have enough experiences with the platform and was not aware of the potential strengths and weaknesses.

In the CoP for Video and Post-Production most of the core-experts felt that they were going to integrate a new tool to be able to communicate and this issue has affected the enthusiasm and readiness for engagement negatively. Especially it was felt during the first 6 months but also during the second year for the project. Even though plenty of the actual experts are technologically experienced it seems as if they were reluctant and uninterested in using Google+ as a tool for interaction and communication.

Online meetings through Google+ were only made twice. After that the Core Expert group decided to change to Skype for online meetings.

Most of the written communication between core experts and with the wider community has been done through common email.

The CoP management has felt that the choice of Google+ as a useful tool has been quite progressive. However, considering how most people are used to communicate it seems as if the experts involved have felt Google+ as time-consuming and technologically too far from the actual use of common tools.

The management has gathered the following positive and negative experiences:

- Positive issues: Google+ felt as an all-in-one solution with many features. User-friendly and easy to combine graphics, videos and attached files with text and other elements. Google+ seems to be robust and efficient. The CoP has not experienced any particular errors or constraints.
- Negative issues: Socially and seen from a communication point of view – the traffic and the number of people attached with Google+ is quite low. The CoP has felt that the opportunities to reach new areas and more experts or feedback from interested professionals have been hampered by the fact that Google+ was decided as the main platform for interaction and communication. The fact that one of the most important objectives in Presto4U is about reaching awareness in specific communities and get useful feedback in order to identify gaps and need of standards and relevant technologies does not comply with the use of Google+.

3.1.3 Tools to collate data: schema, questionnaire, interviews, poll, needs form

In order to collect data for the progress in WP 3 and WP 4 the CoP for Video- and Post-Production produces a questionnaire. The technical issues to be further investigated in terms of best practices, currently used standards, use of preservation, and exchange tools was validated by the research-partners in the project and afterwards discussed and approved by the members of the cores-expert group.

The questionnaire was tested on a number of cores-experts and after some adjustment the management felt it was safe to diffuse the questionnaire to a number of post-production users and professionals.

Due to the fact that there is a high degree of diversity within the post-production community with many different users and different output, composition and background the management decided to arrange a follow up on the questionnaire. The follow-up was organised as an interview where a selected number of professionals were interrogated about their specific feedback in the questionnaire.

The interrogations went out to be quite successful. The management found that plenty of misunderstandings were removed and at the same time the CoP received considerable extra input about workflows, best practices, lack of tools, education and training from the actual players.

The management also decided to combine the interview with face-to-face meetings with the core-experts. The first core-expert face-to-face meeting in the project was therefore arranged as an interview where the experts were they had the opportunity to immerse into certain issues and problems which they felt was important.

During the second year the CoP has arranged a few mini-surveys in order to receive feedback on more specific technological issues. The surveys have been completed in PrestoCentre website and in the Google+ community site. Although these surveys have been quite narrow and 'nerdy' it seems as if they have succeeded in creating feedback from a wider community. Therefore the management recommends that future research within the field of post-production – where many different issues and user-groups are on stake - will be arranged in smaller questionnaires which are more feasible and manageable less time demanding framework.

3.1.4 Tools to disseminate: newsletter, CoP pages on PrestoCentre, events, flyer, schema

Since November 2013 the CoP has produced **8 newsletters**. The newsletters have been available on the PrestoCentre website and they have been diffused by mail to other CoP's and members of the consortium in general. The newsletters have been properly edited and designed in MailChimp by the coordinator's office.

A distributions list has been produced addressing the members of the wider CoP-community which is about 500 users.

Besides from information about progress and emerging activities the consortium has covered a number of issues relevant to the discussions in the core-expert group and addressing issues which the industrial market ought to catch up with. Some of the issues have been:

- DPP – Digital Production Partnership's developments in UK. Especially the CoP has felt it has been important to point out the significant technologies and standards which emerged from the partnership and how they were received and implemented by different players in the post-production community.
- The DPP-report "The Creative Revolution" which the CoP has felt was the most important publication in this field during the project period.
- <http://www.digitalproductionpartnership.co.uk/what-we-do/future-of-digital-production/the-creative-revolution/>
- Exchange of video assets: Best practices and standards in different organisations. How are assets and media files exposed, exchanged, compressed, adopted? How are metadata used in order to ensure proper reuse of preserved data? How are media files captured and adopted?
- Cost-efficient preservation solutions for small post-production companies.
- How can even small and freelance-based companies manage to offer and retrieve media files and sequences in cooperation with others? Is remote editing an option? How can they expose their assets in order to make new business models?
- Best practices regarding 'shopping windows' and ways of promoting and exposing video-assets to other communities and customers. What is the best B2B-way of doing things? Who are the stakeholders – where are the obstacles?

- Training: Digital preservation technologies include a wide range of facilities, options, technical features, and opportunities which again calls for more even more expertise within a certain profession – e.g. editing assistant or video coder.
- Post-Production – preservation. Main issues identified. What are the most common obstacles?
 - Disorganised collections
 - Lack of resources
 - Lack of professional preservation specialists or archivist in post-production companies.
 - Rapidly changing technologies
 - Lack of semantic data for content

The CoP has been involved in **2 workshops**:

- The first workshop was organised by the consortium management and went out as a wrap up of the actual results from the first project year. The workshop took place in Paris. Several of the CoP core experts participated and took part in the plenary discussion about which issues and priorities should be the main focus during the remaining part of the project.
- The second workshop took place in Copenhagen and was more narrowly scoped on preservation issues in film- and broadcast video archives as well as in post-production companies. Especially the workshop focused on common challenges and relevant solutions and emerging progress in the marketplace.

Both workshops are assessed as successful because they have revealed the most important issues and problems and the CoP management has felt it has been useful to involve the feedback in the more specialised discussions in the cores-expert group.

The CoP has been involved in the creation of a **printed flyer**. The flyer has been diffused on different seminars and workshops around in Europe. However, it seems as if the flyer would have gained more attention if it had been diffused as a digital asset.

Tools to grow the community: Blog PrestoCentre website, special communications and actions you have undertaken

The CoP leader has promoted the objectives and results of the workshop at two occasions:

- Participation in Nordic Seminar for broadcast archives in Stockholm (autumn 2013)
- Participation in preservation workshop at BBC (November 2014)

During the second year the CoP-leader has contributed with inputs on the blog attached to the PrestoCentre / P4U-website. Furthermore the CoP leader has used the P4U-website for small surveys on best practices and actual use of preservation tools and technologies.

3.2 The Community's long term digital preservation needs

The identification needs of long term preservation tools as well as gaps between the current preservation practices and what is currently available of tools and standards from vendors and on the marketplace has been done in several steps and ways.

Compared to many of the other communities in the consortium, the post-production world is extremely diverse consisting of thousands of companies and institutions with many different professional backgrounds, stakeholders and objectives:

- Different business models
- Different policies driving different objectives
- Different use of preservation (sales, archiving, cultural heritage etc.)

The following model roughly demonstrates the three main dimensions in the diverse community:

International community of networks and practices

This community consists of very large institutions and enterprises - e.g. EBU, ENEX, BBC, INA – which are typically very consistent and homogeneous. These institutions / companies are taking care of a lot of objectives and business-areas and among them are post-production. Standards, methodologies, and tools are well-known and used in order to keep workflows, different professionals, and deliveries together.

Corporate / national / regional community of networks and practices

This community consists of large and medium-sized – more specialised networks, institutions, and enterprises - e.g. Digital Production Partnership (DPP), networks of exchange between film- and video archives in Scandinavia, Germany, France. These networks are becoming more and more homogeneous. However, due to differences in the approach of making video-archives digital and different gateways to use of business-models there are not consistency between the different networks / communities. Standards for preservation and exchange of media-files and metadata are attached to the local or regional communities and although standards are similar there are different ways of using them.

Free market “community” of practices

This community is the most comprehensive. However, there are plenty of different business-models on stake and most of the decisions taken in order to find ways of saving and keeping video-assets and how to preserve them are mainly determined on the assessment of potential revenues, B2B solutions and similar. The general workflows are provisional and assets are only kept for production interest – not for reuse, exchange or archiving. However, there is a big interest in finding outsourced solutions for storage and preservation. The DPP-initiatives in UK has attracted a number of small post-production companies.

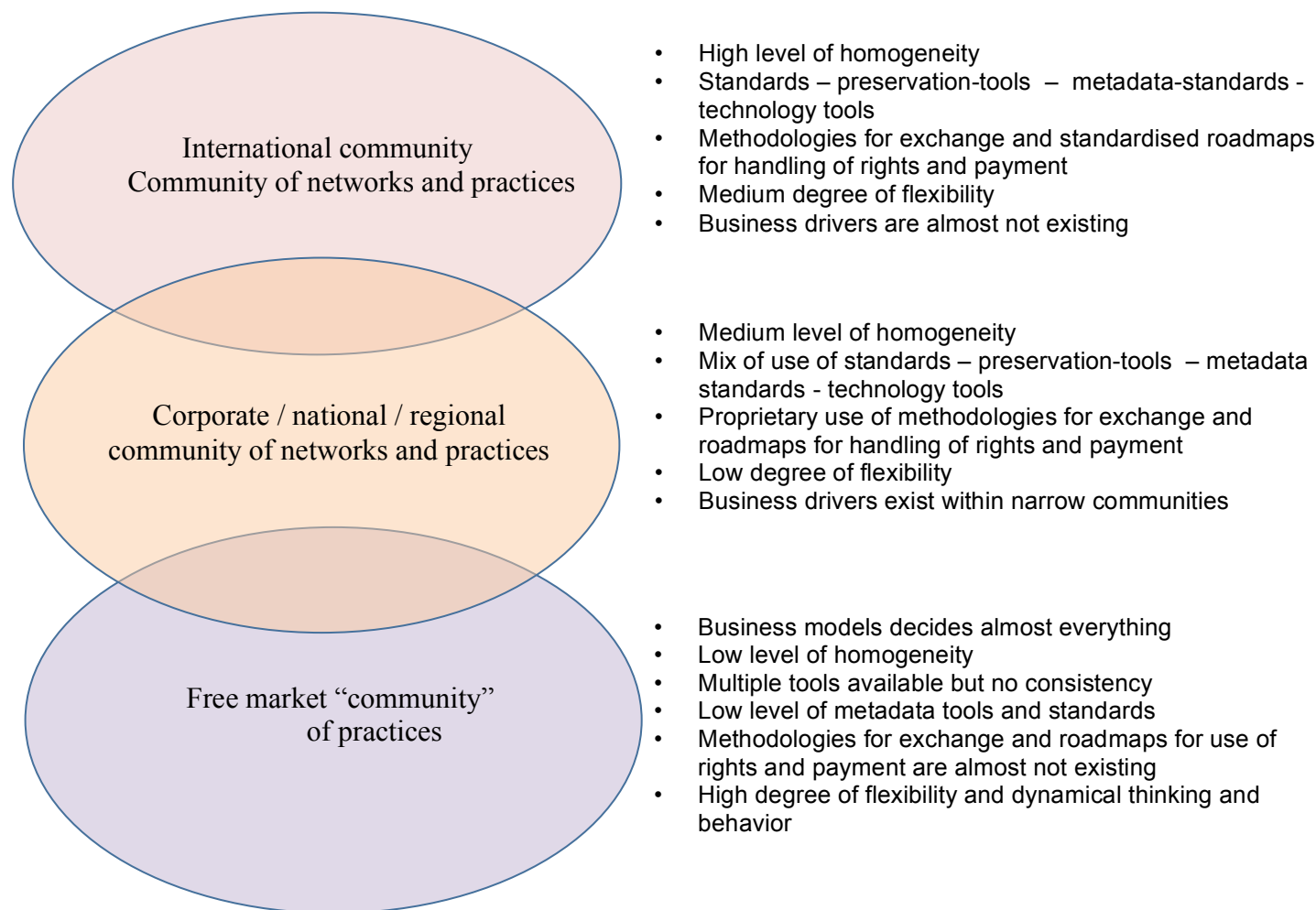


Exhibit 7 The sub-communities of post-production companies, institutions and professionals

3.2.1 Gathering of data and surveys

The diversity of the many different users in the community is reflected in the survey which was conducted in year one. The CoP management decided that to design a survey and additional interviews it was necessary to include a large number of options and answer-opportunities which made the research operational to many different companies and professionals.

To be able to coordinate and compare the results from the many different user-categories it was decided to make use of an overall structure based on a Knowledge Schema (Task 2.3 - Knowledge Transfer with Growing Communities of Practice). The aim was to use a shared taxonomy of topics which would work as a backbone for the whole project so the different CoP's would express their needs by referring to generic topics.

The big challenge was communication and understanding of the issues and questions. Many end-users are not professionals from the archiving and documentation world and they barely didn't know what was meant by *preservation* and *standards*. Therefore it has been necessary to define specific terms and expressions. The management also decided to arrange a number of trials where the questionnaires as well as the interviews were tested.

The CoP also discussed the different issues and items in the survey with the core experts. Especially discussions about priorities and terminology were felt as very important.

Input from surveys as well as interviews were manually treated and placed in the results-documents to avoid misunderstandings or inconsistency between different users.

3.2.2 Identified needs

The biggest part of post-production companies is not capable of having an archive of their assets. Some assets are saved and preserved, some are not. Archiving, preservation, use of metadata, and storage is often a question about how much assets are reused but also cultural and organisational habits are critical factors for how much attention post-production professionals are paying solid and efficient preservation and storage workflows.

Rapidly changing technologies and opportunities are currently challenging the best practices, standards and the use of conventions. The turnaround time for new technologies is becoming shorter. This affects the support for investments in preservation and media management tools negatively. At the same time the file based world becomes increasingly more complex due to many options and new workflows. The use of conventions is very diverse due to many different workflows and user-scenarios within each individual organisation. People are requesting standardised roadmaps and pipelines for long term preservation and ability to store assets without worrying about how new technologies affect the storage and the preservation.

Most companies have not estimated and planned preservation efforts in their budgets. To be able to be competitive and to survive on a turbulent market, companies are very often not able to include costs for preservation and media management in their budgets. However, the price of NOT dealing with preservation and proper media management standards has never been calculated.

No formal archivists. The main amount of post-production companies consists of a staff with less than ten persons. Although most editors and media managers are peripherally familiar with preservation standards, they do not have the sufficient time to improve their skills and to manage archive and preservation tasks professionally.

Generally, there is a **NEED** for cooperatively based, centralised, or international solutions where users are capable of getting / buying / requesting professional services for long term preservation. Common workflow platforms, workflow tools, processing for storing and managing content, formats and codecs throughout and greater use of common tools for metadata generation

Long-term storage and storage facilities:

Many users and post-productions companies do not find it particularly cost-efficient to store their own assets in local storage facilities and servers. They are interested in shared facilities, local, regional or international – where there are opportunities of safe, costly, and quality-based storage. They are searching for the ability to manage workflows through centralised tooling, such as Cloud-based ones, for storage, processing and metadata. Cloud based storage is seen as a way to store assets and at the same time be able to handle the assets in an efficient client-server like IT-environment. The confidentiality to cloud-technologies has changed during the last couple of years and increasingly more and more users find it useful to store their space-demanding video files in cloud servers.

Intelligent and intuitive preservation / automatic metadata:

Users express that they want preservation and metadata technologies which are able to make the tedious stuff automatic, and remove the need to input data manually. Most post-production companies do not have archivists or preservation-professionals attached to their staff. They are interested in de-humanising the workflow around archive with automated metadata generation and intelligent search facilities applied.

They are interested in:

- Intelligent video analysis tools
- Intelligent software tools searching on content with metadata generated by intelligent software tools
- Intelligent tools for metadata addition based on semantic conventions and standards
- Intelligent handling of different versions of files to be used for different purposes in future

Some users propose development of centralised DAM-solutions based on Cloud-storage. Users are interested in as few codecs as possible, and more generally there is a more consistent demand for common standards for audio, video and graphics and the desire for consistent management of metadata.

Access, price and right

Users are interested in solutions where other users will be able to search and retrieve metadata and visual information about their content. They want tools which make it easy to access archive material for a wide variety of uses, including the monetisation of content, faster access for clip search and a better ability to see what is there and the rights associated with content. They also point out the necessity of legacy metadata. The input of these metadata is going to be handles individually by each uses, however, to be easy to use the legacy data should correspond with a legal framework based on standards

Tracking

There is a need for at tracking-tool. Due to complexity and more advanced workflows which include different users external and internal there is a need for tracking of content. Users want more visibility of content as it moves through the workflow.

They also want to be more concerned about versioning. They want to increase their opportunities of easily creating and managing versions including the ability to package content as it moves to the next stage of the workflow. They want more visibility of versions, status and location and the ability to view the dna of an asset

File format, compilers and wrappers

There is a need for an open standard file wrapper with very broad scope. A more efficient and standardised compiler / wrapper is requested for easing the exchange of video files between different experts or segments in the post-production workflow. The current technologies are felt as heavy and time consuming and there is a general need for intelligent or intuitive wrappers which are able to do the tedious stuff in the background.

AS-11 (<http://www.amwa.tv/projects/AS-11.shtml>) is highlighted as a vendor-neutral subset of the MXF *file format* to use for delivery of finished programming from program producers and distributors to broadcast stations. The file format is mentioned as one of the more useful file formats in future.

Quality control

Automated QC is an important issue in future post-production workflow. Users want a quality control with video and audio codecs including checks of wrapping and metadata. DPP has launched a QC-functionality which seems to bridge the gap between the many different uses and their need of consistency.

Training - preservation

Many of the smaller post-production companies are staffed with freelancers or professionals with especially technical or production backgrounds. There is a need for preservation skills and expertise in the organisations and training in metadata management, preservation management, rights management and search and retrieve functionality is requested by a big part of the users.

3.3 Barriers to the Community's adoption of new technology

Cloud-usage

From the survey it clearly appeared that many post-production and video-archives are worried about using cloud technologies. However, almost all feel optimistic and think that they will be more confident with the opportunities in the future.

Since the introduction on cloud-based technologies on the market there have been some concerns over cloud.

In 2012 – KPMG made an analysis which proved that 48 percent believe customers' biggest concern over cloud migration is a loss of control. As well, 39 percent say that data loss and privacy risks are a major worry.

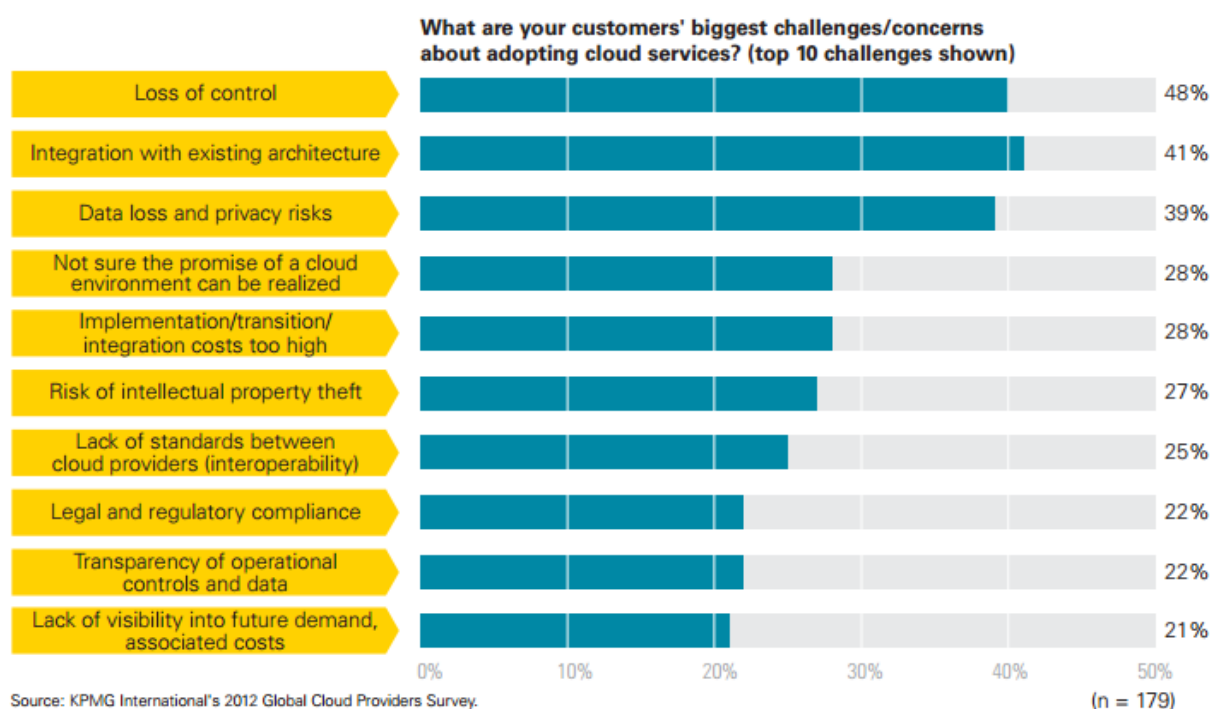


Exhibit 8 Challenges to buying cloud services

Other barriers which prevent users in the post-production area from use of cloud technologies are:

- Data loss and privacy risks – a matter which is highly critical to many video-archives because of their rights protected assets and the fact that backup of video is a costly issue, which prevents many companies from outsourcing their data storage.
- Risk of intellectual property theft. Unfortunately there have been a number of cases where cloud-providers have not provided sufficient data protection and therefore theft and loss of data has been revealed.
- Lack of standards between cloud providers. Most post-production companies are dependent on business cases and models where flexibility is extremely important. Therefore they are reluctant to cooperate with providers and platforms where there is a risk that they will be locked to certain tolls and output options.

KPMG has revealed that many of the issues preventing companies and post-production professionals from using cloud-technologies are based on lack of information and knowledge about pricing-models and security issues.

To attract customers and to bridge the gap between cloud-providers and video-archives, post-production companies etc. It is crucial that the cloud-marketplace improve their information strategies about:

- Pricing
- Flexibility in use of tools and standards
- Security

Intelligent and intuitive preservation / automatic metadata - barriers

Strong and valid tools and metadata-applications for intelligent and intuitive handling of preservation workflows and automatisisation of video-analysis and semantic handling of assets already exist in many of the current technologies offered at the market. However, state-of-the-art is that it is only very large institutions and companies dealing with post-production that are capable of buying and implementing these tools and technologies.

It is crucial that the global market for cloud-platforms and DAM systems (digital asset management) will contribute with more flexible solutions based on cost-efficiency for smaller and more diverse companies – e.g. by providing shared platforms and shared tools for smaller customers. From the survey it is clear that the biggest part of the post-production professionals is requesting shared (maybe even cloud-based) platforms for the handling of their video-assets.

Some of the most common specifications are:

- Ingestion
 - The system must allow customers / professionals to quickly and securely upload media objects while still providing a compelling user experience.
 - The ingestion workflow that defines the communication among all involved components needs to be managed by shared professionals (outsourcing).

- Processing
 - Scalable computing resources are required for media processing, such as document format conversion, image processing, and media transcoding.
 - The media processing workflow needs to be managed by shared professionals (outsourcing).
 - The system must allow end users to quickly and securely download media content while still providing a good user experience.
 - The serving workflow needs to be managed by shared professionals (outsourcing).
- Media Applications
 - The system supports the integration of media metadata with application specific domain data. It also allows for the development of scalable media applications, such as asset management, and content sharing, on top of this data.
- End User Experiences
 - The system provides compelling user experiences for multiple clients such as browsers, mobile devices, and desktop applications.

Tracking – barriers

The need for a tracking tool is quite mandatory, especially for post-production companies and their deliveries to other vendors, customers, broadcasters etc. Due to complexity and more advanced workflows which include different users external and internal there is a need for tracking of content. Users want more visibility of where the content is processed as it moves through the workflow and as it is on the flight between different platforms.

We are not talking about barcode systems – however, it is a kind of barcode-system, attached to the actual video- and audio assets and the system should be able to track version, status and location.

The main barrier is the technology providers. There are plenty of tracking-systems for tapes, disks and packages. However, when it comes to the file-based environment there is nothing. It seems as if technology hasn't found the right business case for a digital tracking device.

File format, compilers and wrappers, QC Quality Control – barriers

The need for a more vendor-neutral subset of the MXF-file format to use for deliveries – internally and externally has been requested by almost all responders in the survey. There is a need for a simple standard. However, it is not clear what exactly people are requesting apart from something which is affordable and easy to integrate. The tape formats used in the broadcast industry has always been specially tailored to the industry itself, so too have the video files.

The British Digital Production Partnership (DPP) has agreed using Advanced Media Workflow Association's AS-11 convention. This constrains the broad capabilities of SMPTE MXF (Material eXchange Format) to a subset relevant to programme- and file based delivery. The full title of the file format to be used for HD programme delivery is "AMWA AS-11 UKDPP HD Shim". There's also a "UKDPP SD Shim".

The rules are indicated here: <http://www.amwa.tv/projects/rules/as-11/>

The headline features of AS-11 DPP HD files are:

- 1080i/25 AVC Intra video
- 24-bit, 48 kHz PCM audio
- Important metadata describing the programme
- MXF OP1a wrapper
- A data rate of around 50 GB per hour

The British step to use AS-11 as the standard framework for file and programme delivery may prove to be crucial to the whole broadcast, film and post-production industry.

The AS-11 framework for delivery is not completed. For example, it doesn't cover UK DPP Descriptive Metadata. However, it does provide a clear, unambiguous working definition of the UK DPP Shims specified in AS-11 and is being actively developed.

The next step which will be included in the framework is certification of File Based Analyser devices (e.g. Automated Quality Control (AQC) products). The analyser is tested in October 2014. The DPP will define test criteria for Analyser products by the end of October, and begin. Follow the DPP-compliance-programme here:

<http://www.digitalproductionpartnership.co.uk/what-we-do/compliance-programme/>

3.4 Connection between the Community and suppliers and vendors

The CoP management as well as the core expert group has not been able to attract suppliers or vendors. However, DPP has been represented through a consultant from Mediasmiths <http://mediasmiths.com/> which has been coordinating the DPP-initiatives for several years. At the same time Mediasmiths has been responsible for a number of significant reports concerning the challenges for to post-production industry in UK – among the “The Reluctant Revolution” <http://dpp-assets.s3.amazonaws.com/wp-content/uploads/2013/04/The-Reluctant-Revolution-FINAL.pdf>

There are several reasons why there are no general or formal connection between suppliers / the marketplace and the post-production community.

- Inhomogeneity of professionals - common communities of practice are not existing
- Lack of shared objectives
- Lack of shared business cases and models
- Lack of focus on standards and best practices

There is a significant lack of homogeneity between professions working in the post-production industry. Post-production professionals are typically composed by:

- Commercial staff / marketing and creative staff
Promoting the and trading the video and footage requested
- Researchers / Librarians / Archivists
Preserving, searching and retrieving material
- Legal staff
Defining and administrating copyrights and rights concerning material during its lifecycle and while it is requested and reused in new contexts.

- Technical staff
Ensuring preservation systems and content- or assets management systems are available and managed.

The problem is that the different professions are not communicating proactively with each other and therefore overall strategies and focus on long-term objectives, standards and infrastructure does almost not exist.

Many organisations are made up by a mix of genuine professionals (i.e. educated lawyers, technicians, archivists etc.) and at the same time they are hiring freelancers which are competent and flexible but do not provide any input to the overall objectives.

Each profession is pursuing each individual goal and agenda and confuses the focus on strong and powerful standards which in the end may be able to benefit all professions.

The industrial partners are challenged by the diversity because they can't address their products and their need for a critical mass to improve their products.

The lack of a proper infrastructure affects the whole area negatively and most results in terms of new standards and products are achieved by short-sighted business cases and models which – if you take the short view – are favouring parts of the industry (e.g. the DPP-initiative in UK) but unfortunately not the general community.

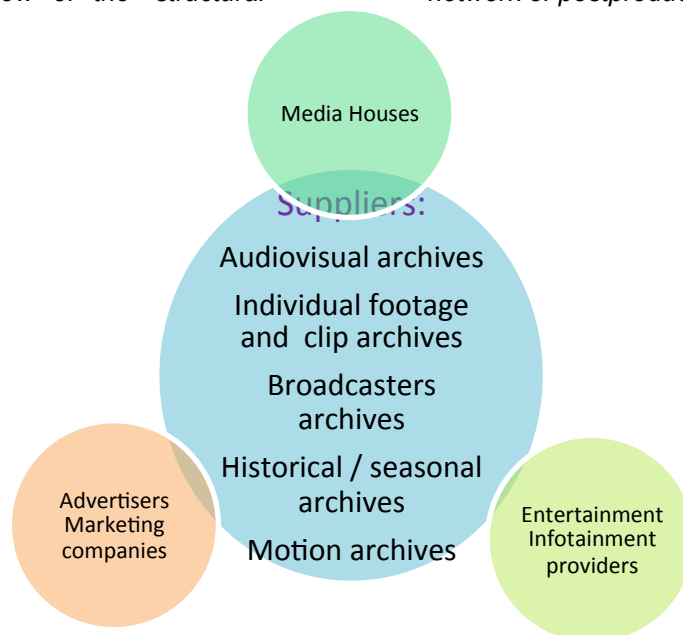
PrestoCentre might be an institution that in future can reinforce the infrastructure in this field (see next page - *Overview of the 'structural' network of postproduction institutions / companies*).

The main objective should be to promote best practices, new guidelines and knowledge about standards and workflows, feasible for easy adaptation and usability.

The results should be promoted by:

- Stimulating the development of dedicated exchange-platforms for sharing and exchanging video footage and at the same time offering efficient tools for standardised preservation, metadata management as well as standards for trading, solving copyright issues.
- Disseminating the use of best practice and common use of platforms for exchanging media among suppliers and customers, providers and end-users. E.g. by involving existing national and international platforms for buying and selling media, broker-forums and clip-forums trading video- and stockshots for multiple use.

Exhibit 9 Overview of the 'structural' network of postproduction institutions / companies



3.5 Recommendations for the future of the Community

From the current results it is obvious that the actual initiatives among post-production companies, broadcasters and production companies in UK regarding DPP is the most successful step forward against the make-up of a video (and audio) post-production infrastructure based on:

- Standards (technology, file management and quality delivery)
- Conventions (metadata, preservation tools)
- Tracking of content (search & retrieve facilities)
- Shared roadmaps (use of link and online facilities)

Until now it is clear that the national approach has a stronger impact than the European and therefore initiatives in the future should be made on the development of a national or regional infrastructure and roadmap rather than a European. Some examples could be Scandinavian-Nordic cooperation, a Baltic cooperation, a Benelux cooperation and similar. However, the initiatives in UK may be of great value in order to promote and visualize how a proper system of rules, conventions, standards and technologies including obligations for the users can make an impact.

Besides promoting the DPP-initiative, PrestoCentre should arrange national / regional *stakeholder events* or meetings where post-production companies, professionals, institutions and industrial partners were informed about the results from DPP.

Meetings / events should focus on:

- Main issues on standards and workflows
- Determination on how to diffuse and promote standards and knowledge
- Best practices and potential important roadmaps
- Business cases and revenues
- Determination on potential test beds and trials

- Determination on dissemination efforts
- Time schedules
- Communication plans
- Milestones and evaluation

Questionnaires and user-surveys should be used to find them most significant gaps between common practice and the lack of tools, technologies and networks for making a more efficient an B2B-based collaboration.

Results from Presto4U – output from WP 3 and WP 4 – should be promoted and used as documentation for the general need for standards and tools and professionals / experts from other countries should be used to promote and inform about benefits, threats, business opportunities, flexibility and improved revenues.

The following point of views and estimations are based on evaluation and discussion in the core- expert group.

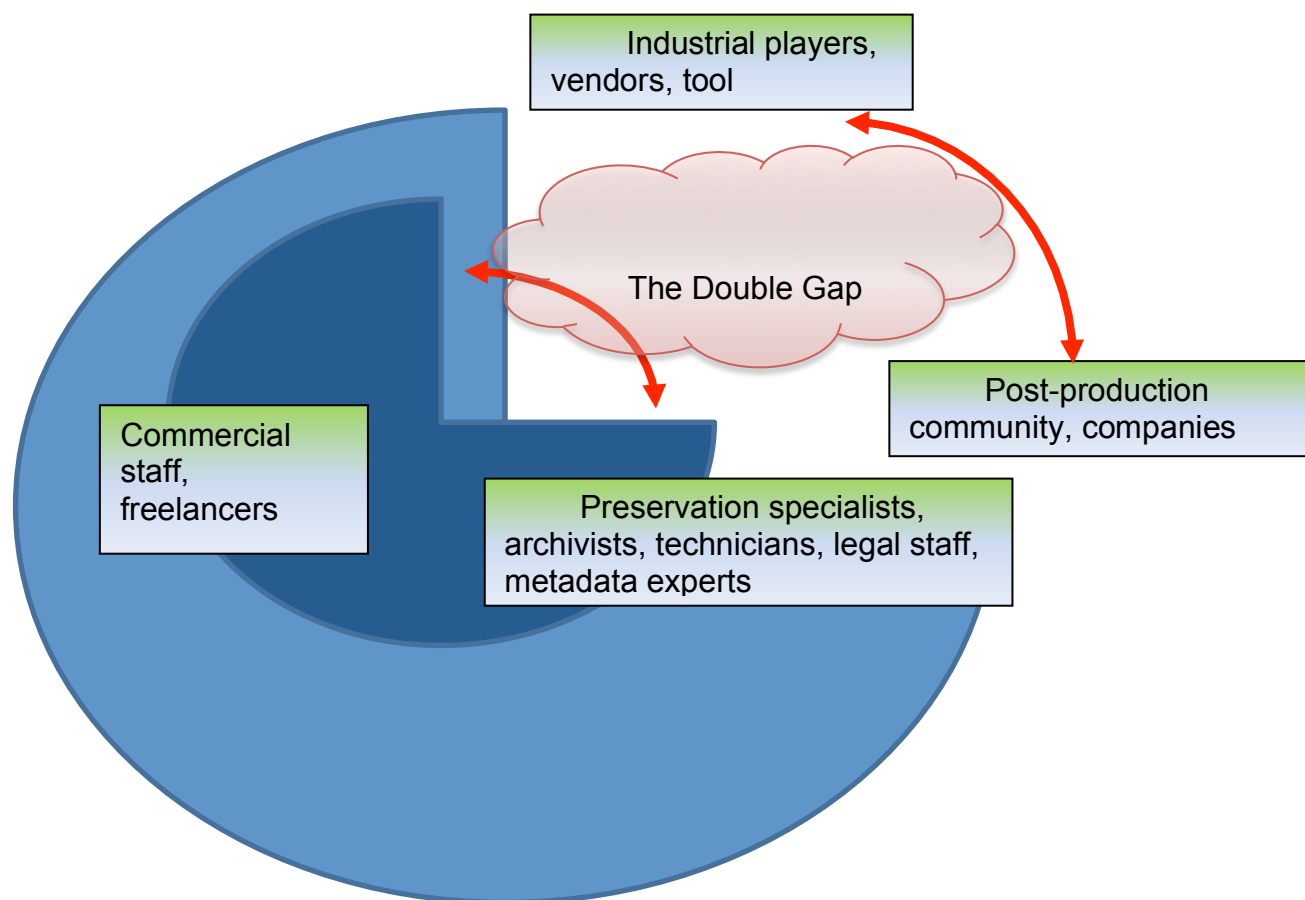
Highlights from the project

The focus on post-production – in terms of “a community” – and based on a more study-based approach has felt to be positive. Until now post-production has only been addressed peripherally by more or less indiscriminate blogs or interest-groups. The industrial players address the post-production field regularly but with a clear commercial aim. Therefore the actual study and focus on important issues, such as standards, preservation, best practices, homogeneity, conventions, infrastructure etc

Especially the gaps between the many different sub-communities within the area - nationally, professionally and technically on one side and gaps between the professions, institutions and companies (the customers) and the industrial field on the other side is seen as the most important problems for bringing more standardisation and infrastructure into this particular area. The core-expert has called this important issue for **the double gap**.

The core-experts feel that Presto4U and the actual efforts in the CoP of video- and post-production has brought more focus on the overall gap and its consequences for the development of tools, standards and what should be done for bridging the gap. However, the project and the initiatives in the CoP has not made any progress on the issue of how to cope with the inherent gap between many different native professions, freelancers, commercial staff, preservation professionals etc. This gap has an almost anthropological character.

Exhibit 10 “The Double Gap” - the overall gap between industrial stakeholders and post-production field – and the inherent gap between different professions, freelancers, commercial staff, archivists, etc.



Expected impact

The core-experts feel that the communication and discussions at the meetings have been held in a way where different areas – professionally as well as institutionally – have been respectively taken into consideration. However, at the same time there is a strong sense that the post-production field is extremely complicated - especially due to the fact that business cases and commercial revenue are the big drivers for development and progress.

Even though the stakeholders' individually are very keen to make improvements, conventions and more consistency to reach consensus for a more efficient collaboration and organisation of workflows, it seems that they tend to underestimate the needs of other professions. For example there is a wide gap between the commercial staff (very many of these particular stakeholders in this community) and the preservation and metadata professionals. However, it seems that mutual understanding of different needs and demands is evolving and that there are opportunities of more consensus in future. There is a need for 'lighthouses' and attractive business cases and models. Therefore the core experts find the actual DPP-initiative in UK very interesting and relevant. A lighthouse-strategy should be discussed in order to use the actual DPP-initiative as a tool for bridging the gap between different stakeholders and interests.

The core-experts find that the DPP-initiative should be placed in the center of European post-production development to act as inspiration and an attraction for bridging the gap and to achieve more mutual respect between the different part of industry and the user communities as well as the different stakeholders (commercial, professional, freelancers etc.).

Currently the Digital Production Partnership-initiative is a national initiative. The core-experts do not expect that a similar pan European action will be realistic for the next few years. However, PrestoCentre and European Commission institutions around in member states should promote the initiative to the broadcast and video community to create attention to the benefits – technologically and economically. If the results - tools, standards, conventions, quality control instruments etc. – are disseminated with respect to the national or regional conditions, there should be good opportunities for take-ups and implementation in other counties.

The DPP-initiative is not only a relevant use case for the whole community, it is also very relevant in terms of something which may be able to inspire other part of the post-production field to develop and share even more advanced frameworks and standards.

The quality of preservation-tools and the use of specific preservation technologies are very modest in the post-production community. The core-expert believe that the rich and almost ubiquitous use of search-engines and new search & retrieve facilities in order to find important video material for reuse and sales will increase the necessity of adding and using more powerful metadata in the preservation workflow. The core-experts believe that the structured use of quality metadata has changed and will improve though the next year. Especially the vision of exchanging and using metadata in common and shared communities, where metadata will be reused for automatically extraction is present.

Some of these initiatives should not only be promoted in Europe. The core experts feel that there is a need for common actions between countries and regions where significant video production is maintained – USA, China, Canada, India, Brazil, Russia, Japan, and Australia. The post-production infrastructure does not only belong to video-archives and preservation of older assets. The post-production issues are also linked to the world of multimedia and cross-media management. Therefore there is a need for shared roadmaps and simple standards and conventions for:

- Storage (in cloud?),
- Preservation and metadata production for automatic archiving,
- Intelligent wrapping and quality control and last but not least
- Roadmaps for easy and cost-efficient exchange of assets between multiple types of companies and institutions.

Exchange, transportation and reuse of video assets is one of the most common processes among post-production professionals. At the moment there are many different ways to do it. If a more common framework based on standards is agreed the companies and stakeholders involved should be able to save tremendous costs. Today only very large institutions based on the needs of broadcasters' news-exchange have standards for efficient interaction of video assets and clips in Europe – EBU, EXEX, Reuters. The core-experts find that there is a strong need for more simple and less demanding technologies for exchange and transportation of video-files.

CoP-leader's comments

The incitement to join the Community of Practice has been experienced as quite low due to the fact that the experts and other actors who have been involved have only been compensated almost symbolically for their efforts. If a similar project based on a strong voluntariness should emerge it is crucial that there will be allocated a budget for the involvement of experts. Many resources have been used only to communicate and create awareness of the necessity to join the expert group.

PrestoCentre has been a strong platform for coordination, communication and handling of information during the project. They should be capable of managing new take-up's and dissemination tasks within this area.

A next step should be to create more awareness of the current lighthouses in Europe among post-production companies and professionals. It is strongly recommended that dissemination strategies will be based on the need for new business opportunities, shared revenues and community facilitation where different players can practice cooperation, sharing of tools, conventions and storage without compromising their integrity.

The CoP Video- and Post-production is defined as a community of users who share a passion for creating "media for makers" and in the same sense users aim at refining and standardising preservation facilities in order to exchange and reuse assets for new video productions, video products, and deliverables.

The core issues in this community is first of all based on the needs of commercial players, B2B, and the business opportunities in media houses and broadcasters, post-production companies, advertisers and marketing bureaus. Currently, the typical pattern is that there is only a very low degree of interaction between the many different organisations and sub-network.

The presence and wider use of digital media, digital workflows, and digital media is calling for more evident and cost-efficient roadmaps and sharing of knowledge regarding best practices. There is certain need for more standardised navigation and interaction across technical and geographical borders based on different workflows, legacy issues, cultural rules, and standards.

Especially the need for efficient B2B business cases is quite clear and the community aims therefore to focus more explicitly on transparency, training, accessibility, administrative and financial facilities.

The management of the CoP Video- and Post-Production has been planned and implemented by TV 2 Denmark. TV 2 is a media house, semi-commercial with a huge digital production of video-assets for all purposes – e.g. public service, commercials, infotainment, edutainment, entertainment – aimed at television and web-based outputs.

Although TV 2 is a rather young media house (25 years' experience), the company has obtained large results and a quite substantial turnover based on the development of new business cases and B2B-models.

Through interaction, marketing, and business-based relationships TV 2 has built a strong network and relationship with video-media actors from all over Europe. The actual network is going to be used as a platform for attracting more companies to take interest in the Presto4U progress as well as to take part in the contribution of relevant feedback to the project. It is expected that the feedback will be used to gain overall data and facts about currently used workflows, preservation standards, best practices concerning exchange, handling of legacy issues, barriers and restraints, and needs for developments and emerging standards.

It is also expected that the actors are going to take part in meetings, communication and workshops arranged by the community-management as well as the project management. Meetings with Core Experts will be held regularly and when a wider community is identified it is expected that they will be included and take part in workshops, preservathons, and webinars.

4 Sound and Music Community of Practice

4.1 Introduction to the work done, general challenges and progress

Sound and music archives have reached a critical point in their history marked by the simultaneous rapid deterioration of unique original materials, the development of expensive and powerful new digital technologies, and the consequent decline of analogue formats and media. It is clear to most archivists that our old analogue-based preservation methods are no longer viable and that new strategies must be developed in the digital domain.

The objective of our CoP was to analyse the current technological advancement and the awareness prevailing among stakeholders. We have therefore made an in-depth search defining the largest possible community in the European archival scenario, setting up an initial list of 330 potential Sound and Music repositories, from which a later selection resulted in our core experts. Starting from this research conducted in the early months of 2013, we contacted those stakeholders who were willing to collaborate and selected the so-called “core expert group”, a network of experts who has an extensive experience in the field of audio-visual materials archiving.

This group, formed by a small number of members, represented the core of the requested expertise in the project and has been the privileged interlocutor for gathering information and feedbacks on the needs of the CoP. Their mission was to communicate any practical problems they incurred in carrying out the daily basis archival tasks, to participate in information exchange with other members of the community and in general to actively participate in any action that could increase the collective experience of the community.

As an internal communication workspace, the CoP maintained a Google Community platform where all core experts used to provide updates, to archive reports, and conduct project communications. This platform enabled to access project data and communications at any point in time and provided the ability for core experts and project team members to collaborate well together.

One of the tools through which we collected information was the survey tool on the Presto website, the knowledge scheme created by *KCL* and *CNR*. In other cases it has been instead preferred to work “independently” and, for this reason, it has been proposed to each core members a custom questionnaire, in order to collect specific information to be analysed, matched and compared in the subsequent steps of the project *Presto4U*.

After the identification of experts and the first contacts and discussions, we moved to the phase of the development of the first face-to-face event/“preservathon” in December 2013, in order to directly share expertise and information between expert members and us. About 80 people attended the organisation of this workshop⁴⁶, which took place in Paris on December 4th within the *INA* premises. The objective of the workshop was to present the outcomes and advancements to representatives of the different communities of the project (including obviously Sound & Music Archives) and hear from them what are their challenges regarding preservation.

⁴⁶ <https://www.prestocentre.org/presto4u-workshop-2013>

In the meantime, at a more peripheral level, there also existed a variety of users and stakeholders who didn't participated directly at the development of the project, but being part of the working community, have been involved on several occasions in expertise spreading.

For this reason, in 2014, *INA* proposed and designed a webinar⁴⁷ concerning the difficulties in the preservation of audio materials from the professional sound and music archives point of view.

In addition, we started from January a regular monthly publication of newsletters, which dealt with upcoming events, updates and library highlights. Many blogs (almost every month) have been published on the *Prestocentre* website, on topics that could be interesting for our community and easily accessible at the same time.

We also managed to get an official publication on *IASA Journal*: for this occasion we wrote an article on the preservation perspectives arising in our CoP, which was published on the issue n.43 – July 2014.

In mid-November and early December 2014 will be held respectively the second and the third "preservathon" events and of course we will be present with our community. What *INA* is expecting by both of them is to acquire (and spread) common digital preservation best practices, and to identify problems regarding the evolution of the preservation community, particularly regarding the adoption of new technologies.

4.1.1 Activities for year 2

During the second year of the project, the main task was to enlarge the conclusions of year one in order to verify the situation of the Community. Two hypotheses had been retained:

- a- The Sound community is a well-established community, with a long tradition in digital preservation, and a structured knowhow and practice. No major problems identified among this community.
- b- In the Music community, a deep preservation problem is identified related to the way music is produced digitally today. No preservation tool exists capable of keeping on the long-term the results of music recording and production, often leading to a loss of past work.

In order to verify these hypotheses, once the expert group through our monthly meetings agreed on them, the work consisted in meeting physically or on the phone different experts of the domain. For the Sound community, 3 members of the Audio Engineering Society were encountered and 7 archive responsables from different institutions (Radio, Music Museum, Production Centre) which all confirmed this hypothesis.

For the Music community, there was an important meeting of the Electroacoustic Music Studies Network⁴⁸ in Berlin in June 2014, where, after a presentation of the preservation issues related to musical production in Presto4U, 15 content producers from Europe and the US were interviewed to understand their position and validate the urgency of research and tools for preserving musical production environments.

⁴⁷ <https://www.prestocentre.org/calendar/webinar-why-preserving-contemporary-music-productions-so-difficult>

⁴⁸ <http://www.ems-network.org/ems14/index.html>

In the Sound domain, the community is already well established and disposing of regular conferences (AES⁴⁹, IASA⁵⁰) where these issues are discussed. It is interesting to note the evolution 5 years ago of the meaning of IASA, which initially meant: International Association for Sound Archives, which has migrated to: International Association for Sound and Audiovisual Archives, however keeping the IASA initials. Interesting to remark that even if the AES is very keen on sound preservation, the problems of Music production environment preservation seem quite distant from their worries!

For the Music production community, the EMSN conference is indeed a good occasion to continue on the structuring of the community. During next conference in Sheffield (UK) in June 2015; a special workshop will be organised.

⁴⁹ <http://www.aes.org/>

⁵⁰ <http://www.iasa-web.org/calendar-date>

4.1.2 Interactions with other WPs

Experts of the Sound and Music Archives community participated to the activity of workpackages 3 and 4.

WP3: contribution to the identification of potential usable results from research (mainly the *Archivematica* system was looked at very closely). Contribution to the analysis of AV content rights situation.

WP4: contribution to the analysis of economic situation and the precise gaps related to their activity. Contribution to standard-based tools by the analysis of needs. Some discussions on brokerage and tailoring, however Sound archives are already well established in Preservation while Music Archives rarely share or collaborate on these issues

WP6: The contribution of the S&M Archive experts was essential for this transversal workpackage; they participated to all questionnaires and interviews on the technical issues, economical analysis, economic impact of digitisation on their activities and take-up of research results. The community was quite diverse so it was good to have opinions from different kinds of actors; the results converged strongly in most cases.

4.2 The Community's long term digital preservation needs

The preservation quality level of this community is quite advanced on multiple levels: its storage capacity requirement is much lower than the required amount for video or film, this situation permitted to established quite early an uncompressed format as a standard. This has led over the years to a considerably lower use of energy and economic resources than other communities, allowing music and sound archives to ingest, preserve and make publicly accessible their contents in different contexts.

Since the commercial introduction of the compact disc in 1982, the standard sampling rate for CDs has been 44.1 kHz, with a bit depth of 16 bits. In the 30 years since those compromises were made, the storage capacity for digital recording and digital carriers has increased considerably. The DVD then emerged as a format used for movies and multichannel music, allowing playback of audio in high fidelity. Content producers, distributors and associations such as *IASA* noted that a higher bit-depth allows more audio information to be stored within the digital file, including support for a greater dynamic range (The 24-bit digital audio has a theoretical maximum dynamic range of 144 decibels).

Based on these reasons, digital audio for use in libraries and cultural institutions, especially for preservation-quality audio and audio digitised from an analogue source, adopted higher sample rate and file bit-depth. The current standard for archival digitisation of analogue recordings requires the sample rate to be 96 kHz with a 24-bit depth, in a linear PCM format file. No less than the 96/24 configuration would be recommended for preservation copies; even if user access copies down-sampled to 44.1/16 suffered a minuscule loss in audio quality, that seemed an acceptable compromise to keep the preservation standard high.

All this has been well established for years and in the last decade little has changed in terms of quality standards and technological improvements, except for the fact that we are moving almost unanimously towards a file-based scenario, in which contents are no longer constrained within a specific type of carrier.

It should also be noted that digital sound cards with good A/D converters are widely accessible also to consumers and, from the point of view of technology, we have now reached something that seems to be a high end for high-fidelity audio. In even simpler words: audio quality in the near future can hardly be better than what we currently have, simply because it is already excellent.

Despite these favourable conditions, the challenges facing the long-term preservation present however great difficulties, some of which are solvable, while others will only get worse as time goes by.

All the archives share most of these problems, whether they are “sound” type or “music” type. But as we always did in our previous papers, we prefer to treat them as two separate categories, so to have a more detailed vision of each world.

4.2.1 Sound Archives

The biggest issues for sound archives all belong to the pre-digitisation phase, and basically can be summed up in two: the inexorable deterioration of the original carriers and the increasing unavailability of playback equipment.

It is well known that tape has been around for over seventy years, and the microgroove disc for about sixty years; despite this amount of time, it's still relatively easy to find pieces of hardware for the reproduction of these two supports. But for the most ancient forms of registration (e.g. 78s), or those who have had a short commercial life (*DAT* is an example), we already encounter considerable difficulty in finding equipment to allow their playback. Most of the time, therefore the preservation of the sound passes through the protection of the original media, to which each decision must take into account a number of delicate and complex factors.

In the area of audio-visual recordings, we can identify two broad categories of media: mechanical ones (phonograph records, used exclusively for sound) and magnetic ones (tapes and cassettes for pictures and sound). To these two types, we must add digital optical disks.

Since most of these carriers are made of plastic materials, the discussion on their conservation can not be separated from an analysis about polymers: in fact, the processes of chemical modification of the substrate of these supports concern all forms of recording, and environmental factors such as storage conditions, the temperature, the humidity and the manipulations contribute to a more or less long-lasting existence.

Aside from the oldest sound recordings, such as phonographic wax cylinders, the so called “instantaneous” or “direct-engraving” discs, usually made of aluminium coated with a layer of cellulose, constitute a category of sound recordings among the less stable. Practically all of these discs are irreplaceable originals - many of them of great cultural, historical and scholarly importance - and they must be systematically copied at specialised facilities because of their fragility.



Exhibit 11 Aluminium coated record with a valuable recording of a theatre work by Cocteau, technically irrecoverable

Since the fifties, microgroove discs (or vinyl) gradually replaced the 78's; although they have proved to be one of the most stable materials among those used for sound recordings, their life is not infinite, as their main constituent, polyvinyl chloride, undergoes degradation when exposed to ultraviolet light or heat.

Aside from the deterioration of the carrier, what has truly become a commonly perceived threat; there is the obsolescence and the relative lack of availability of original equipment for playback. It is important to note that all the analogue (or digital) documents on a medium are dependent on specific devices that allow access to the information they contain; consequently, the need for suitable equipment becomes an issue of considerable importance for those who manage collections, either because the maintenance and replacement of these devices is not always easy, or because they remain on the market for a very short time and their technology quickly becomes obsolete, especially since digital technologies have made their entry in the sound recording at the beginning of the eighties.

In short, requirements in terms of equipment and technical expertise, particularly on analogue carriers and playback equipment, are such that many institutions are struggling with this. Unfortunately, this problem cannot be stopped in any way; it is a fight against time, before it is no longer possible to digitise the contents, for one reason or another. In most cases funding issues are the most common impediment for digitisation.

4.2.2 Musical Archives

They typically share exactly the same problems and issues of the Sound community, except for those archives directly related to music production activities, such as record labels, publishing companies, music recording facilities and contemporary music

production centres.

Nowadays music is produced in complex digital environments, which imply the management of hundreds and even thousands of sound files inside specific software for musical recordings, editing, and post-production. The continuous and constant technological evolution that these facilities experience makes difficult to preserve digital objects.

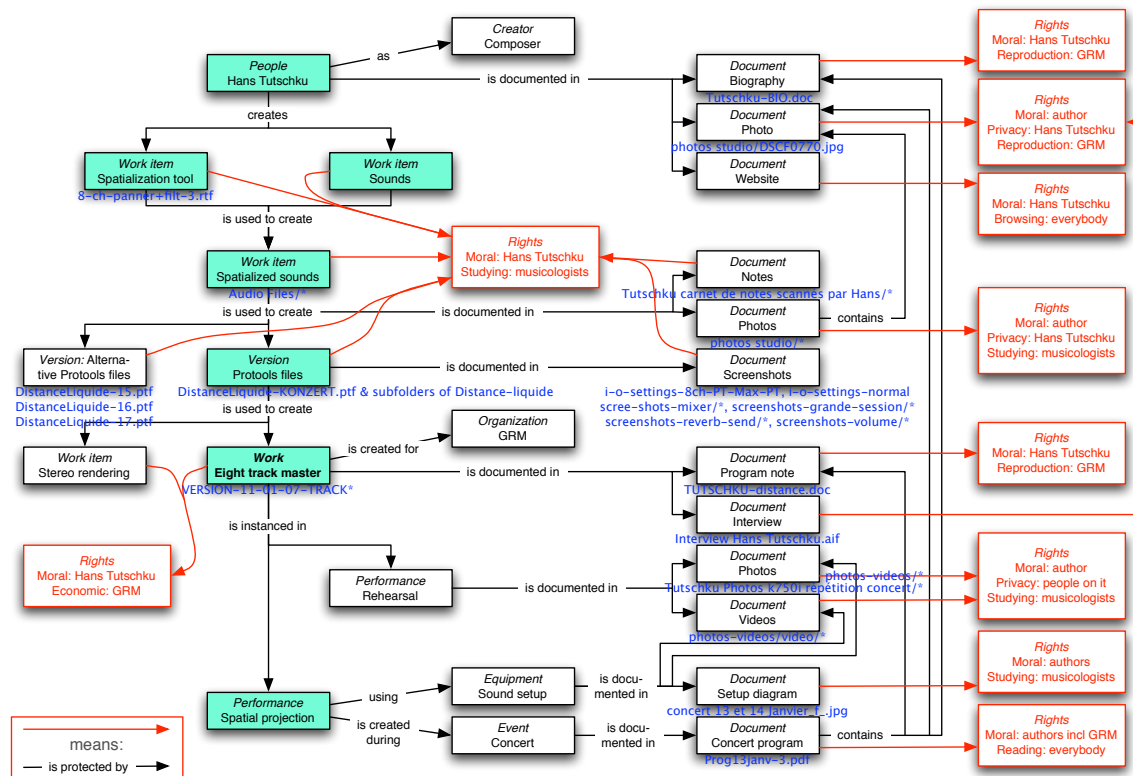


Exhibit 12 A schematic description of the components of a musical production

Preservation is extremely important in the music industry domain, since past productions are often “remastered” or “remixed”, which respectively means that:

- The 2-track analogue tape master is recovered in order to make a brand new (digital) version of the mastering process.
- A new version of the same work may be issued in the future with a different arrangement of the musical material or even an inclusion or replacement of existing instruments by different ones.

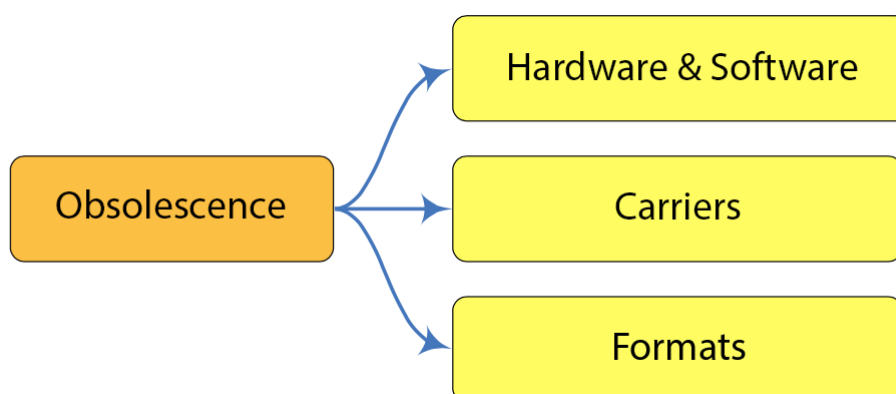
In case of “remasters”, a company needs to preserve all the open-reel master tapes in a climatically controlled environment. Since there are no specific deadlines for a remastered album reissue (it’s often made to celebrate significant anniversaries of the release of an album), the preservation process must continue for an indefinite period of time.

The case of “remixes” is even more complex, because it’s crucial to keep the integrity of the original mix, to be able to access the old software session and to understand how the mix was done and originally structured. The preservation process for these production environments is the same as with any audio content; however sessions contain not only sound-files, but also many other different types of files, strictly dependent on proprietary software that may update, evolve or even disappear. The slightest software incompatibility (at any level: operating systems, digital audio workstations, plug-ins, etc.) may result in a

loss of the session for further reuse.

There are basically three big problems that complicate the preservation and the future reproducibility of digital production environments: the obsolescence of hardware and software technologies, the obsolescence of the carriers and the obsolescence of formats.

Hardware & software - The first and most immediate issue is the obsolescence of the technological platform (hardware and software) required for the use of digital content. For several decades we have witnessed a constant evolution of this infrastructure: a newly purchased computer is already obsolete after only two years and it should be replaced with a more modern and powerful machine in order to keep compatibility; the operating system must also be updated to the new version and parallel programs with which we create and manage digital content should also be updated or replaced by others. In a matter of years, technological changes make obsolete the hardware and software infrastructure, forcing us to change it: in this continuous process we change drivers for reading storage media, we change the input/output ports, we change the software, etc. The obsolescence of hardware and software is a serious threat to the possibility of maintaining digital content over time.



An emblematic example is the version 11 of *Pro Tools: Avid* which has completely redesigned the plug-in format, so that *Pro Tools* 11 now uses only 64-bit plug-ins (AAX - Avid Audio eXtension - is the new unified plug-in format), instead of the old 32-bit plug-ins (RTAS, TDM, 32-bit AAX). The result is that the older plug-ins versions are no longer reproducible in the new *Pro Tools* environment and painful messages such as "plugin loading failed/this plug-in file no longer exists" are likely to be very common, whenever we'll try to open an old session. It is the typical case in which the original environment will be forever compromised, or at least a part of it.

Carriers - A second problem is the obsolescence of carriers. There is a wide variety of media, including magnetic, optical and electronic technologies. Over the years we have witnessed a rapid development of the storage media used. When in the early '80s the first Compact Discs were produced, everyone believed that their storage capacity was so high that it would be sufficient to meet the needs of data storage for several decades. Instead, after only fifteen years, CDs have been replaced by DVDs, which themselves were supplanted by new supports with more capacity (Blu-ray Disc); The problem of obsolescence of the carriers appears when a technology begins to be obsolete and the data stored on that medium become inaccessible.

Formats - A problem often overlooked, but in fact perhaps more complex than the one

represented by the carriers, is constituted by the obsolescence of formats. Even assuming that media are still in good conditions, we will probably have trouble accessing their content, since the former format used by the program could be no longer managed by the current programs, and it is difficult to find conversion or emulation tools for converting those files into formats available today. The way to solve this kind of problem takes place with the adoption, since the formation of digital content, of formats that satisfy the requirements to provide the best guarantees in terms of long-term storage.

Among the effects of the several transformations carried out by the digital revolution, one of the most troubling concerns the preservation of contemporary electroacoustic music heritage. This is a very complex task that requires specific skills and a clear institutional support.

The preservation work is completed with the conservation of the performance practices and the technical and cultural heritage with which the works of electroacoustic music have been created. Electroacoustic music is a relatively young field in the history of music, but for decades it has been raising difficult questions for its preservation. Some problems are common to all forms of culture that make use of technology and electronics, but others are specific to the composition and performance techniques developed in this field of music. Moreover, in its short life, electroacoustic music has gone through many phases - the tape music of the '50s, electroacoustic music mixed for voices and/or instruments and tape, live electronics, the voltage-control technology, the computer music, and so on —each of which poses different problems in terms of preservation.

A common element to the early decades of the life of electroacoustic music is that most of the works, or of the electroacoustic parts of them, were fixed in their final form on magnetic tape and the preservation of such records become paramount. Nevertheless, to preserve electroacoustic music it is not sufficient to transfer the contents of the analogue tapes into a digital format: we must also maintain the performance practice of these tapes (especially in the works for voices and/or instruments and tape). This means to keep all the information needed to understand and reconstruct the entire production process of the work, such as the specific details of the composition, the electro-acoustic system used, the operating practices employed, etc.

Equally important is the knowledge of technical equipment and operating practices used by the composer in the implementation phase of the work. Regarding the equipment, it's difficult to obtain and to sustain over time the operational functionality of the obsolete machines, whose components are often impossible to find and whose maintenance work becomes difficult. It is therefore important to track and retain the technical (drawings, specifications, dimensions, etc.) and functional documentation (manual) of the various devices and of the entire production system. Each musical work becomes a system itself.

These works are also in a certain way penalised in terms of circulation. In fact, the concert organisations hesitate to schedule them for technical reasons. A whole list of repertoire of electronic music is threatened because of their irreproducibility.

If no effective action will be undertaken, the major production centres for classic, contemporary, or popular music risk of losing most of their collections due to complex preservation environments and lack of descriptive information permitting the understanding of the preserved contents.



Exhibit 13 mixed electroacoustic performance with percussions, loud-speakers, recorded sounds and real-time processing (Paris, Maison de Radio France, 1991)

To summarise the encountered problems:

- 1) *Software incompatibility*: mixing session files are proprietary files dependent on a commercial software company. New versions and subversions are issued regularly bringing new functionalities or adapting to changes in the operating systems. The main issue here is backward compatibility, which is normally assured on an $N-2$ version. However if there are major breaking changes in technology, this may be shorter. Often features from a previous version are lost or not compatible with existing versions.
- 2) *Incompatibility of associated software*: mixing sessions often contain plug-ins for sound processing or enhancement, which act in real time on the sound and the result only exists during the playback unless a specific copy of the result is done on a new audio file. Incompatibility issues are much stronger here, mainly when plug-ins of different companies are put together on the same mixing session. Plug-ins also contain settings, which are memorised as independent files; the setting files correspond to a precise version of the plug-in. This implies that all the necessary plug-ins need to be kept alongside with the mixing session, multiplying by an important factor the risks or obsolescence. The main problem in such a complex environment is that the slightest incompatibility may result in a loss of the session for further reuse.
- 3) *Knowledge associated to the session*: composers and operators build up the sessions and gradually become familiar with it. They construct the mixing session in function of the context, structure them on their habits and experience, and establish internal hierarchy depending on the nature of the music and of the project. The

operator has knowledge of the session, which belongs to him and is not transmitted except on rare occasions. When a mixing session is re-opened for some reason, if it's the same operator, he may recognise the hierarchical patterns he laid down for the session. Conversely, if the operator is someone else, he will have to go through the entire session in order to try to reconstruct the meaning of the choices made by others. In many cases remixes are abandoned due to the complexity of understanding the underlying pattern of the mix.

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

- *Keeping the mixing session:* As explained already, obsolescence is very quick, and the number of elements associated with the session can be huge (ranging to thousands of different files for a complex session). Different preservation issues are present here, depending on the nature of the files to preserve; however files are interlinked and often dependant, what defines more a network of files with defined interrelations more than a set of files and folders.
A common interexchange framework exists among the different commercial products, called *OMF* or *OMFI*, which is an encapsulator of elements produced by a sequencer. It may contain sound or any kind of media and is used in production to assure exchange among the different sound sequencers. Often mixing sessions are kept as long as they are accessible, or updated manually by opening the session in a more recent version and creating an updated version. However no automatic procedures or checking is done as a preservation action. Mixing sessions may also have accompanying material as scores, sketches, plans, physical or digital, which are a part of the session and need to be preserved equally.
- *Keeping the associated knowledge:* The knowledge related to the mixing session is kept in the operator's head. This is oral memory, subject to oblivion, modification and quick loss. In some cases hand documentation is made, but the time consumed in this operation is too long regarding production times, which tend to be short for economical reasons (it is expensive to have musicians on stage or in the studio). In other cases documentation is done after the production (if time is available) but often without any precise methodology in order to capture the indispensable information, which would permit a different operator to understand the logic and hierarchy of an unknown session.

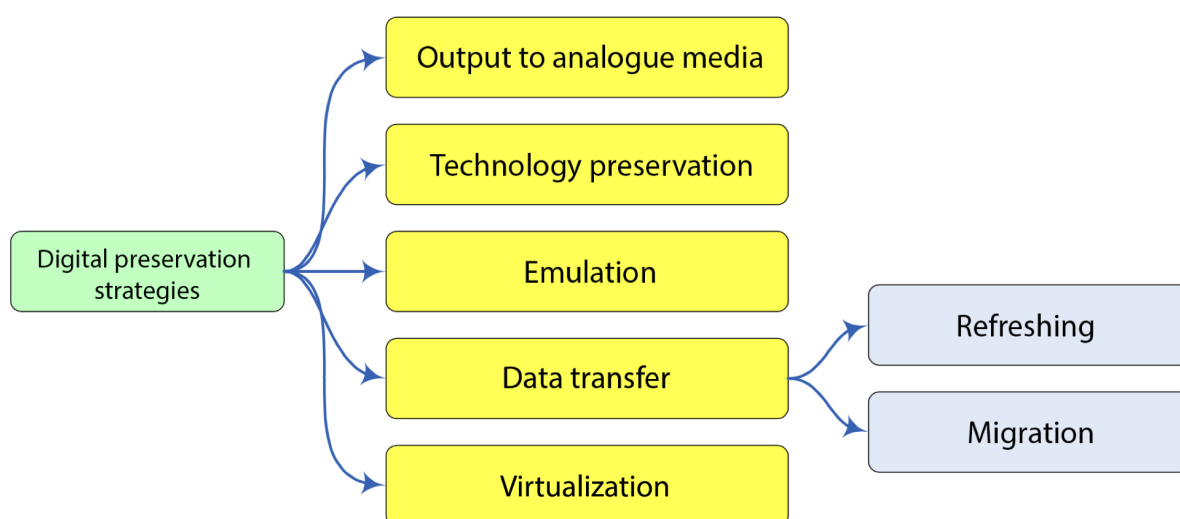
4.3 Barriers to the Community's adoption of new technology

Audio materials that are left passively on the shelves will one day be lost. Conversion of analogue materials to digital is inevitable and urgent, for the preservation of their contents and to provide access to the wealth of information and cultural-historical documentation that they represent.

Over the last twenty years, the problems associated with audio digital preservation have been addressed from many points of view. But useful solutions at software level are unfortunately few, and will be listed at the end of this section.

No single strategy may be applied indifferently to all contexts, and none of the current preservation methods is entirely satisfactory. What we can do is rather to adopt conservation strategies in order to reach a compromise solution, although not definitive. These types of approaches have emerged for years; they are chosen each time according to the contexts of use, often in combination one with the other. The main ones are the following and they will briefly be examined in order to identify advantages and limitations:

- Output to analogue media;
- Technology preservation;
- Emulation;
- Data transfer: refreshing and migration;
- Virtualisation.



Output to analogue media - The first and most obvious conservation strategy is based on the following consideration: if the analogue media (paper, film, etc.) have so far been able to maintain over time the information, why not continue to use them even in this digital age? Although at first sight it may seem unbelievable, this is still a strategy widely implemented, even in organisations of a certain complexity (such as large companies or public archives).

This is adopted particularly for the storage of feature films: a 35mm, when stored properly, can last for 100 years before deteriorate and, although producing a film copy is very expensive, an analogue printing of digital information could be a good solution to preserve the master in the long term.

However, today that the originals born directly in digital format, there is still a need to produce their analogue "surrogate"? Again: the production of an analogue version of the digital object is a proper conservation strategy?

Of course, this is absolutely not a viable strategy for our community, and this for at least two reasons. First, it eliminates the "intelligence" of the document, that is to say the ability to search and retrieve information, and the simultaneity of the usage; an archive of hundreds of thousands of entries would become totally unmanageable.

Secondly in the transfer can be lost, in whole or in part, the metadata information needed to determine the context of the message.

Ultimately, it should not be forgotten that the maintenance of archives for the preservation of the physical media requires significant space and cost. This solution is not

feasible for the Sound & Music CoP: a born-digital content must be stored in digital format.

Technology preservation - Another strategy that at first glance might seem applicable consists in the preservation of the technology needed to reproduce digital content in their original form. This strategy obviously implies to keep in working condition those devices used at the time of creation, both the hardware (the computer, the attached peripherals, musical instruments, etc.) and software (operating system, programs with which they were created digital content, drivers for media drives, etc.). This type of solution leads inexorably to the creation of veritable museums, in which to keep in good working condition old computers needed for the use of digital content that we intend to keep and reproduce.

This type of strategy can extend the time window of the media and obsolete file formats access, but it's obviously not a definitive solution, since no type of hardware and software infrastructure can be maintained indefinitely in operation.

We must keep in mind that maintaining an obsolete technology requires remarkable investments. It is, therefore, a strategy that could be considered valid only for the conservation of extremely important and rare resources: could be the case of some old synthesizers now unavailable on the market, or of the first computers used in computer music of the 80's, or any other tool that is functional for the reconstruction of a work environment.

Nevertheless, we should be aware that they could be maintained running just for a limited period of time, waiting for the adoption of a better long-term storage strategy.

Emulation - The conservation strategy called emulation consists in recreating an out-dated hardware and software environment on a more modern computer, simulating the behaviour of the original equipment.

For instance, a *Commodore-64* emulator is installed on a modern PC, the content of concern (e.g. games) is copied from the *Commodore* tape recorder, and then *Commodore* games can be played on the PC. While transcoding has been the main strategy for long-term use of content, emulation may become a viable alternative, in particular in the light of current research and development of virtual machines.

Emulation is certainly one of the most technically challenging approaches and the most time-consuming work to be able to replay a work. Nicola Bernardini and Alvis Vidolin⁵¹ give the example of Stockhausen's work *Oktophonie*, which requires a personal computer *Atari ST-1040*: it has disappeared from the market long time ago. There are *Atari* emulators running on modern computers, but nobody knows if the program *Notator* used by Stockhausen will run on an emulator, although the user communities can provide some assistance.

Data transfer - To ensure its survival, audio content should be periodically transferred into new supports. The "direct" transfer (also called *refreshing*) consists into moving digital content from obsolete storage media to new ones, without changing the bit pattern of which it is composed. The new support can be of the same type or different types. It is a process that, regardless of any other conservation strategy is adopted, is always necessary. From the technical point of view it's relatively simple, with a very low risk of data loss, if performed and documented correctly. Beside this, we should also take for granted the "substitution" transfer (known as *migration*), which is the conversion of a digital content from a format usable in a particular hardware and software environment to a

⁵¹ N. Bernardini, A. Vidolin, Sustainable Live Electro-acoustic Music, in "Proceedings of the International Sound and Music Computing Conference", Salerno, Italy, 2005.

format usable in another environment. This means that content encoded in older formats are converted into new formats that can be used on modern computers. It is a strategy that must be implemented when the changes in hardware and software are beginning to be threatening and codecs are becoming obsolete.

To be fair, this type of strategy is vital especially for visual documents, whose formats are constantly changing from year to year. Regarding the audio world, we don't feel a compelling need for migration, partly because any uncompressed PCM formats (Wave, Aiff, etc.) or compressed lossless formats (Flac, Apple lossless, etc.) seems to hold up well the passing of time and it seems that there are no significant changes on the horizon.

Despite this, a field of particular interest for the use of migration may be the programming environment *Max/Msp* from *Cycling '74*: with the migration process we could resume a previous version of a patch and adapt it to the technological change occurred, such as the change of operating system, a major technical development for new treatments, or an incompatibility between versions of a same software. The migration activity is most prevalent when we go back to old works: many composers have had their works brought from a technical environment to another. All institutions in the field of electronic arts face somehow the necessities of migration.

Virtualisation – In terms of software preservation, virtualisation is the expression of digital objects in a form independent from hardware or software dependencies. This goal, easy to express, is obviously very difficult to achieve, since the ability to understand the expressions of the digital objects depends on the knowledge of the reader.

From the perspective of a long-term preservation of digital processes, virtualisation process should be preferred as a technique that can make the digital object independent of a particular underlying implementation. This approach is not, however, without challenges. Beyond practical programming problems, it appears clearly a major problem: in fact, any virtualisation process involves a series of major changes to the original document, both in terms of form (syntax) and, at least potentially, in terms of semantics. That's why it is necessary to develop a precise methodology to ensure compliance of this virtual representation to the original, which passes through the establishment of an exact match between the original and the virtual representation.

As we can see, the issues related to the digital preservation are extremely complex and involve several different scientific and research fields. What is clear is that digital content will not be preserved "alone" and it takes a reasonable solution to solve the problem. At the present it is not yet clear what are the best strategies for digital preservation, especially with regard to the preservation of musical environments. However, it can be said that those who today seem to provide the best guarantees are migration and emulation.

It begins to be clear that often a single strategy is not able to provide a solution to all the problems that may arise, and it is, therefore, important to adopt an integrate strategy that starts with the correct choice of the format in the production phase and continue maintaining continuous care and attention on the content we want to keep.

If we had to make a recap, the situation for our community could be summarised as follows:

- For the sound archive community, as said earlier, the situation is quite clear and there are important literature^{52 53} and publications⁵⁴ concerning digitisation, quality, and preservation. There are no major issues concerning the preservation of sound itself. Digitisation of audio carriers has been done for a long period of time and the formats and methodologies are clearly established.
- However a major unsolved issue was encountered with the preservation of music production recordings, for which no substantial action has been undertaken. The major production centres for classic, contemporary, or popular music face the danger of losing most of their collections due to complex preservation environments and lack of descriptive information permitting the understanding of the preserved contents. It is important to aggregate a large amount of content holders from musical production and share some of the already existing outcomes.

Several interesting projects have followed the preservation issue of musical works with technology. Among them, The *MUSTICA*⁵⁵ project aimed at studying preservation of digital content and understanding what should be changed in archival principles owing to digital mutation. As a special case, used as a laboratory for the project, *MUSTICA* focused on artistic and musical contents. For this case, *MUSTICA* was based on the collaboration between two contemporary music institutions - the *Institut de Recherche et Coordination Acoustique/Musique (IRCAM)* and the *INA's Groupe de Recherches Musicales (GRM)* - to study contemporary music preservation. Through this collaboration, the *MUSTICA* preservation tool has been developed for the hundreds of electro-acoustic works that the *GRM* and *IRCAM* have commissioned over the last decades, i.e., pure acoustic works from the *GRM* as well as mixed and interactive music from the *IRCAM*.

The *MUSTICA* project elaborated a specific model describing the context of production and performance, from the technological and instrumental point of view. It is also possible to list the equipment required for the performance, to get the technical instructions, names of people involved in this work in the past, elements of performance, and any media describing different aspects of the realisation.

More recently, the *FP6 CASPAR*⁵⁶ and the French *ANR* project *GAMELAN*⁵⁷ have addressed the problem at different levels. The latter is especially interesting for us because it wanted to develop a specific production tracker environment, which would allow the collection of information during the production process, fully describing the gradual workflow from source to final product.

⁵² *Sound directions: best practices for audio preservation* by Mike Casey, Indiana University and Bruce Gordon, Harvard University, 2007. Web version: http://www.dlib.indiana.edu/projects/sounddirections/papersPresent/sd_bp_07.pdf

⁵³ *Manual of analogue sound restoration techniques*, Peter Copeland, The British Library, 2008. Pdf version: <http://www.bl.uk/reshelp/findhelprestype/sound/anaudio/analogue-sound-restoration.pdf>

⁵⁴ *The Association for Recorded Sound Collections Journal* is a semi-annual publication that serves to document the history of sound recording and includes original articles on many aspects of research and preservation

⁵⁵ http://www.interpares.org/display_file.cfm?doc=ip2_gs03_authenticity_roeder_v2.pdf

⁵⁶ <http://www.casparpreserves.eu/caspar-project.html>

⁵⁷ <http://www.gamelan-projet.fr/co/accueil.html>

The project objectives were therefore situated on four levels:

- *Production Environments* — Keep track of all actions, since the starting material to finished product; organise production elements (files, software) in structures included as components of the environment; formalise the knowledge generated during the process.
- *Preservation Strategies* — Use the production environment as a platform for preservation; extract structures and knowledge to simplify future access to the environment; apply OAIS methodologies, allowing reuse of the environment and its components.
- *Reuse of productions* — Restructure the production elements with new objectives, adding other materials and editing the links and the overall structure (repurposing, back-catalogue rework); use subsets of the environment to generate new environments and facilitate the process deconstruction and reconstruction for intentions analysis.
- *Digital rights management* — Enable traceability of content on a production to manage user rights. Detect and warn for missing DRM information (artists name, location, person in charge of the production) during the production process itself.

The project ended in late 2013 and the presentations of these findings have recently been reported in international conferences, such as the *EMS* conference⁵⁸ in Berlin in 2014, which is dedicated to specialists of contemporary musical production.

So, as we can see, good initiatives have been undertaken to try to structure the activity necessary to preserve a musical mixing session with the perspective of re-editing it or re-performing it. Even if these tools are far from being perfect, things are moving in the right direction and partial solutions seem to be growing.

4.4 Connection between the Community and suppliers and vendors

Preserving audio recordings is of increasing importance, as the high risk of loss of valuable content becomes widely understood. Many institutions with historic audio content are eager to begin digital conversion, but are impeded by a number of obstacles to successful preservation of audio content: lack of expertise, of adequate storage (both for analogue and for digitised materials), and of playback equipment, backlogs in cataloguing, and uncertainty about digitisation. The small collections in mixed-media institutions are particularly vulnerable, as these institutions often do not have the resources to provide the specialist care that they need.

Sometimes in-house activities like conserving, preserving and restoring obsolete media formats is, due to economic and structural deficiencies, out of reach and the coordination with vendors and contractors becomes mandatory in order to handle large or complex projects.

For many archives, one of the most daunting tasks involved in starting a preservation project can be the selection of a vendor. To those unaccustomed to working with obsolete carriers or with the technologies of preservation and restoration, even knowing what questions to ask a prospective vendor is not easy.

Although the needs may come from any point in the production chain, we can reduce to three the phases in which we may require outside technical assistance:

⁵⁸ <http://www.ems-network.org/ems14/index.html>

- **Physical restoration of the support** – Outsourcing does not necessarily mean handing over all digitising responsibilities to such competence centres. While smaller and more complicated parts of the collections, like coarse grooved discs, may be handed over to specialists, greater parts of the collection (e.g. analogue magnetic audio tape) can well be organised in-house. However restoration laboratories have the capacity to clean, repair, and digitally reformat a wide variety of original sound recording formats:

- Coarse-grooved discs ("acetate" or "lacquer")
- LP ("vinyl")
- Audiocassette
- Microcassette
- ¼-inch analogue reel (half track and full track; 1-7/8, 3-3/4, 7-1/2, 15, 30 ips)
- Digital Audio Tape (DAT)
- Compact Disc (CD)
- Minidisc

Tapes and discs are gently cleaned prior to digitisation. Repairs and other treatments may also be carried out in order to address the adverse effects of aging, degradation or damage of the original media and to ensure the optimal capture of sound during the digitisation phase.

- **Digitisation** – The vendor deals with the digitisation and produces multiple copies depending on the intended use:
 - *Preservation Master File*: this file serves as the highest-quality archival master that will be maintained in perpetuity for creating reproductions of the original recording. Encoding specifications are: 24 bit/ 96 kHz for analogue sources and the original resolution (typically 16 bit and 44.1 or 48 kHz) for digital sources.
 - *Production Quality Access File*: this file serves as a high-quality version of the archival master. It is useful for transcoding to a variety of user-friendly formats and media (like Audio CD).
 - *Online Access File*: these files are optimised for online delivery via streaming or download and, therefore, we extensively use compressed formats such as MP3. Other options, depending on the end-use context or delivery system, are possible.
- **Long-term storage** – Long-term preservation of digital audio should be considered separately from transfer. Normally, public bodies, such as universities, libraries, research institutes, and museums have already established powerful computer centres that can carry this responsibility in a completely independent manner. From a general point of view, small collections holders are even encouraged to totally rethink their preservation policy by questioning the need to keep audio materials in their possession. It may be sufficient to hand over responsibility for their preservation to proper audio archives, ensuring, however, access for the original holder, including restrictions of access for third parties, as appropriate. Alternatively, many private companies propose themselves for long-term storage, in outsourcing, of documents and audio digital files. However not all of them offer the same conditions; it should always be inquired which structures are actually

subjected to strict standards and choose those which provide processes for mandatory certifications. An external company such as *Arkivum*⁵⁹ offers a service that addresses long-term preservation needs, with meaningful guarantees.

Things to Remember

- 1) Outsourcing and using external services does not imply loss of control over the material. The client-vendor relationship functions best as a partnership; it is therefore recommended to follow "actively" all the stages.
- 2) Although the standards for digitisation of audio are quite agreed in the community, we should not assume that all vendors are operating with the same set of processes, equipment, tools, or expertise.
- 3) There are many ways to get from point A to point B, each with its own potentially major implications for the final goal.
- 4) Vendors must often base estimates on very little information about the media and their conditions. This can result in wildly variable quotes and proposals, depending on the assumptions regarding media lengths, condition, workflow, processes, quality control, and more. It is important to take this into consideration in evaluating proposals and in maintaining perspective throughout the duration of a project.
- 5) Even seemingly small processes can have a major impact on pricing. Small parameters can branch out into multiple destination formats and quality control or they may dictate the workflow in a way that affects labour time and cost. Archives should be able to identify these variables and ask how they may affect the overall budget.

4.5 Recommendations for the future of the Community

It is critical that audio preservation systems use technologies, formats, procedures, and techniques that conform to internationally developed standards and best practices. These are typically developed by technical experts and, if competently implemented, ensure that the output of a preservation system is high quality. Standards and best practices also provide a philosophical and ethical foundation for preservation work by outlining expectations and goals for the output of a preservation system along with acceptable means to achieve them. Standards-based technologies will presumably be usable longer, fostering sustainability, and are more likely to generate products that are interoperable.

Both *IASA-TC03*⁶⁰ and *TC04*⁶¹ outline core principles of recommendations and best practices. These publications were produced for the audio preservation community and today represent the unanimously recognised reference for implementing preservation repositories and using digital mass storage systems.

IASA-TC03 provides an overview of key audio preservation topics including selection, preservation transfer, digital archiving basic principles, preservation metadata, format priorities for transfer, and others.

IASA-TC04 is an important high-level recommended practices document for the preservation of audio in the digital domain. This publication includes detailed recommendations for signal extraction from analogue sources, equipment in the digital

⁵⁹ <http://arkivum.com/>

⁶⁰ http://www.iasa-web.org/sites/default/files/downloads/publications/TC03_English.pdf

⁶¹ <http://www.iasa-web.org/tc04/audio-preservation>

preservation chain, sample rate and bit depth, characteristics of Preservation Master Files, target preservation file format, guidelines for storage, and others.

Best practices documents provide guidance for a preservation studio's signal chain and personnel, analogue playback, and analogue-to-digital conversion, as discussed below. In some cases this guidance is specific, while in others it is necessary to apply the knowledge of an audio engineer to derive particular practices from general statements.

If the primary goal of the preservation work is the creation of a surrogate that is an accurate, authentic, and very high quality representation of the original, not only the equipment in the preservation system but also the personnel operating it is of key importance. Professional audio experience, musical knowledge, and the ability to verify or confute their human perceptions with precise measurement, make audio engineers and technicians, the best candidates for recognizing playback problems and intervening during archival transfers.

Lack of qualified staff is one of the main problems for smaller collections: they have no staff professionally trained for working with audio collections. Even a substantial number of larger specialised institutions do not have technical staff that has been specially trained.

4.5.1 Future needs for the Sound & Music Archives Community of Practice

Resources/Tools Needed

- Develop a reference chart of problematic media issues, including tape brands, years of manufacture, etc.
- Investigate the relevance of technology-transfer methods from such fields as chemistry and materials science to audio preservation, particularly in identifying the composition of audio discs and tapes and the non-destructive playback of discs.

Reference Materials

- Develop a Web site that identifies the core competencies for audio preservation engineers.
- Develop a Web-based information on how archives can develop a program of digital preservation transfer, including, for example, information on **potential** sources of grants for audio preservation; a resource list of experts on audio preservation and transfer; lists of equipment for audio preservation and transfer needs; and technical manuals and key specifications for obsolete and hard-to-find equipment. The resource would include guidelines for developing an audio preservation workstation, including selection of hardware, configuration of equipment, optimum wiring for signal flow, and testing.
- Develop a list of music experts who could be consulted for advice on problems that arise in analogue audio transfer of specific types of musical content (e.g., determining the proper key so that the correct playback speed can be established). In addition, develop a source of references for issues that might arise in any audio transfer particular to specific types of musical and spoken-word content.

Research and Development

- Conduct research on magnetic tape problems.
- Do further research into noncontact reading of broken audio discs. Great progresses have been made in the developing of turntables that read audio discs

with lasers. Other methods have shown potential for playing some kinds of broken discs. In addition, prototyping technologies might be used in “virtually” reconstructing disc grooves.

- Research safe and effective cleaning methods for analogue tapes and discs.
- Research the life expectancy of various audio formats.

Infrastructure Needs

- Develop arrangements among smaller institutions that allow for cooperative buying of esoteric materials and supplies. Given that there are fewer and fewer suppliers of phonographs, tape heads, and other obsolete and soon-to-be obsolete equipment, cooperative buying might yield dual benefits.
- Establish regional digital audio repositories. Although some major institutions may be able to afford the care, upkeep, and digital migration associated with maintaining a digital repository, many smaller archival organisations may be unable to afford to store and care for their digital preservation copies over time without cooperative arrangements with other institutions.
- Cooperate to develop a common vocabulary within the field of audio preservation.

Standards

- Develop guidelines for archives on how to judge when to use automated transfer of analogue audio to digital preservation copies. This is a complex risk-assessment task. Those doing automated transfers need guidelines and sources of expertise.
- Develop a comparison of the existing relevant audio engineering standards from organisations such as *AES*, *ARSC*, *IASA*, etc.

4.5.2 Conclusion

There is a huge amount of valuable sound and music material spread over a large number of institutions that are at the moment not in the best position to guarantee long-term access and preservation. The conditions under which analogue recordings are kept are often not adequate, and lack of resources, equipment and expertise make it a giant step for mixed-media institutions with small minority collections to move them into the digital domain.

As new audio technologies evolve and supplant older ones, we risk losing decades of spoken-word and musical recordings that are valuable not only as commercial products but also as cultural artefacts that document who we are, what we feel, and how we experience our world. At present, there are both audio engineers and equipment capable of transferring even the oldest analogue recordings safely to digital. But this will not be true for long. If key technical knowledge is not passed along soon, thousands of recordings may not be accessible in 20 or 30 years from now. Core experts agreed that sharing their expertise with colleagues in audio archiving and audio engineering, both now and in the future, is of vital importance and more communication across these groups should be encouraged to facilitate the sharing of information and recommendations.

The interest in sound materials has turned out to be great now that they can be accessed easily. However, the institutions that hold them cannot be expected to carry out this task on their own. It is time to recognize that materials in minority collections are part of the audio heritage and to include them in national programmes, while respecting their natural habitat, within the institutions where they belong. All the specialists in Europe should make efforts to create centres of expertise to support this huge operation and reduce the weight for institutions with limited resources. Instead of relying on one large

national audio-visual institution to fulfil this role, a support network should be built around existing expertise for work at local or regional level, or across geographical borders for collections with specialist materials.

Combining the experience of large organisations with the knowledge of those working with smaller specialist collections will allow a range of approaches to develop that does justice to the varying needs in audio archiving.

5 Research and Scientific Collections

5.1 Introduction to the work done, general challenges and progress

Research and Scientific Collections are growing in number and size due to the low cost and high quality of nowadays digital recording devices. Audiovisual content has been produced and used for scientific research from the very beginning. In fact, even the “The horse in motion” by Eadweard Muybridge (1878) was used for scientifically verify the assertion of “unsupported transit” in the trot and gallop. However, we are experiencing an enormous growing of research and scientific collections only from the beginning of the current digital area. This is the result of the convergence of low cost camera, information technologies for automatic analysis and availability of sharing tools.

Unfortunately, scientific collections stakeholder, even if they produce and manage huge and relevant collections, did not form a community before the Presto4U project and lack awareness of digital preservation issues. Our CoP main objective was to analyse and increase the awareness among the stakeholders.

Especially during the first year, when we were building the community from scratch, but also during year 2, it was difficult to understand who, between researchers and research community, was using audiovisual contents for his research activity. We identified research results that were made upon large audiovisual contents collections, monitored projects and initiatives related to specific research community (e.g., collections created for benchmarking) and selected international organization that promotes research (e.g., ERCIM). We initially contacted 50 people interacting with the ones willing to collaborate. We selected the core experts between this group resulting in 8 members belonging to various research communities (e.g., linguistics, mobile web, environmental forecasting, multimedia information retrieval, math, medicine).

During both year 1 and 2, the CoP maintained a Google Community platform in which all core experts where asked to contribute with their expertise. This platform was mainly used for communications from the CoP leader to the community members in a convenient way. In fact, while the members enjoyed to be contacted by the leader, they hardly got in touch the ones with the others. The different research fields and ICT technologies knowledge where a major obstacle in having a common vocabulary and language. There were computer scientists that had the capability to easily express their user needs in technological terms, but also researchers in humanities that used much high level and generic terms.

In the first phase, various conference calls were organised. The members found interesting and stimulating sharing the practical problems they incurred in maintaining their collections. Most of the discussion was about the need for funding in order to start considering proper digital preservation of their audiovisual contents. In fact, the research and scientific collections owners and/or maintainers have typically no obligation related to long-term preservation.

Please note that, in principle, any audiovisual contents collection can be used for scientific research. However, in this community we are considering research and scientific collections that cannot be considered also in other CoP (e.g., Music and Sound, Film, Video art, etc...). During the events organised by the Presto4U project we had the opportunity to involve also members from other communities in the discussion. In December 2013 (first year), about 80 people attended the workshop “Digital Audiovisual Preservation in Communities of Practice” that took place in Paris. While the object of the workshop was presenting the outcomes and advancements of the various communities in the project, it was also an important moment of discussion between member of different CoPs. During the second year, this CoP actively participated in the Future-proof AV content for education and research workshop in Venice 6-7 November 2014. In particular, Scuola Normale Superiore and University of Siena gave an interesting presentation about their Gra.fo project. This CoP also participated in the Preservation: Audiovisual Preservation Storage Solutions that took place in Turin, June 25-26.

This community and the “Learning & Teaching Repositories” share the context in which their members operate. In fact, while their collections are very different and do not overlap, most of the members of both communities are part of academic organizations. Thus, it was very common to cooperate and to share experience between the two CoPs. Be

At the beginning of the Presto4U project a community related to the research and scientific collections did not exist. We linked people all over Europe sharing the same problems. Now, a community is in place even if the interlinks are weak. We believe that the importance that the European commission is giving to public access to scientific data (typically called open science) will soon emphasize the issues related to digital preservation in general and to audiovisual digital preservations in particular.

The webinar Expressing Preservation Requirements on Audiovisual Collections by Carlo Meghini on March 10 was specifically targeted to this CoP. We believed it was important to help the CoP member in expressing their preservation needs in a formal way. This should also help them to access the various tools made available by the Presto Center and the new ones that could be created.

There are basically two ways that can be followed in the future: members of this community could start preserving their own collections in a proper way (sort of private collections); hub repositories, at a national, European or specific research community level, could be created in order to aggregate, make available and preserve data from the members. It is not easy to understand what would be the best choice. On one hand, this community members are not ready and have not enough resources to use state-of-the-art audiovisual contents digital preservation technologies even if Presto4U is filling this gap. On the other hand, they would hardly accept giving their own collections to other organizations.

This CoP contributed to understanding standards adoption (D3.4) and Longitudinal CoP Impact Analysis (Task 6.2). Two datasets from this community contributed to the WP3 test dataset.

5.2 The Community's long term digital preservation needs

The problem of long-term digital preservation was not even considered by the members of this community before the start of the Presto4U project. This was particularly evident during the first year but even during the second year every time we tried to enlarge the community we faced this issue. Preservation of research typically means, especially in this community, preservation of research outputs as books, journals, reports etc. Research data, when given, was part of these text outputs. Only recently, with the advent of the digital area, it has become possible to maintain and share research data. While there is a growing attention on preservation of research data especially if they are very expensive as the data produced by the Large Hadron Collider at CERN, most of the researchers believe that reproducibility in science (i.e., the ability of an entire experiment or study to be reproduced) also involves research data. In other words, reproducing an experiments typically also implies “recording” the research data again from the real world.

However, the growing importance of open data in science is moving the focus from reproducibility of the entire experiment to the reproducibility of the analysis conducted over the data. This is the result of two independent forces: experiments are usually very expensive; research data can nowadays be shared easily, from a technical point of view, all over the world using state-of-the-art ICT technologies. On the Vol. 331 of *Science* of February 2011, it was written that “scientific community has been criticised for not being sufficiently accountable and transparent. Data collection, curation, and access are central to all of these issues”. While this citation, even if not mentioned, also includes preservation, most of the ongoing discussion is still on open access.

Audiovisual contents, in this context, are only a particular type of research data. However, we know that their preservation require specific technologies and standards. It is obvious that, in the long term, no open access can be given to research data if not correctly preserved. Thus, we believe that emphasizing the fact that open access and preservation are two faces of the same coins could help increasing the awareness on preservation in the scientific community.

Many of our members said that if they will not have easy and cost-effective solutions to preserve their audiovisual contents, they will be probably be lost. However, they do not feel the responsibility for this eventuality at all. From a legal point of view they are right, because they have no obligations. Thus, the approach of this CoP members regarding preservation is best-effort.

The choice about the specific format in which the audiovisual contents are maintained is rarely the result of a discussion or analysis. In most of the cases, the audiovisual contents are born-digital and the original format (i.e., the format in which they have been produced or made available by others on the web) is usually maintained. In fact, lossy compression and re-compression can have huge negative impact on repeatability of the experiments, which is the core of the scientific research, on the same data.

Conversion of analogue audiovisual contents is considered of secondary importance, even if there are exceptions between our community members (e.g., Scuola Normale Superiore di Pisa is involved in digital preserving analogue audios relevant for linguist research). The existing analogue collections of audiovisual contents intended for research are usually considered deprecated. The focus is in preserving growing born-digital collections.

Two are the main CoP specific issues related to the audiovisual contents preservation. First, lossy compression, and in particular re-compression, can prevent reproducibility of the analysis and research conducted over the audiovisual research data. While the original lossy compression is considered acceptable in most of the case, it is not accepted that researchers working on the same data in the future could assert different conclusions because actually working on data that has changed due to lossy re-compression. Thus, change in format or compression standards during the preservation of these audiovisual contents should avoid, as much as possible, change on the reproduced data. Second, metadata are crucial for the use of the audiovisual contents in any recent context. There is lack of awareness in the community regarding the difficulties related to metadata preservation. Most of the metadata are stored using collection specific schemas that are also not well or not at all specified. Specific research community metadata schema fields (e.g., multimedia information retrieval or medicine) are very rare. In most of the cases, it would be very hard to understand the metadata after the researchers working on them will retire. Sharing audiovisual contents and their metadata helps making more researchers all over the world aware of the particular metadata format.

Regarding rights management there is a significant awareness but a lack of solutions and knowledge. Typically researchers presume to have the right to use them for research purposes or at least they hope that they will not be accused for the rights infringement. In most of the cases they have reasons for that. In particular, it is true that the owners of rights will hardly accuse them for performing research on their audiovisual contents. However, these issues become crucial when considering both open access and preservation. In other words, rights management, is a major obstacle to preserving and accessing audiovisual contents used for scientific research. Privacy and rights issue can even induce researchers to destroy the copy of the data they have worked on.

As an example of the differences existing between the collections that were considered by this CoP, we now present two of them specific of two of our members.

“Grammo-foni. Le soffitte della voce” (Gra.fo), is a two-year project jointly conducted by Scuola Normale Superiore and the University of Siena. The project was funded by Regione Toscana under the PAR FAS 2007-13 program. Its purpose is to discover and preserve oral documents (e.g. oral biographies, ethno-texts, linguistic questionnaires, oral literature, etc.) collected either by scholars or amateurs within the Tuscan territory. Gra.fo aims thus at providing a first-hand documentation of Tuscan varieties from the early 1960s to the present time (Calamai 2012). Gra.fo audiovisual contents are mainly used by researchers in the linguistic fields and are preserved in a digital form. The Gra.fo project was also presented at the Future-proof AV content for education and research workshop in Venice (6-7 November 2014) resulting in an interesting discussion.

MediaEval is a benchmarking initiative dedicated to evaluating new algorithms for multimedia access and retrieval. It emphasizes the 'multi' in multimedia and focuses on human and social aspects of multimedia tasks. MediaEval attracts participants who are interested in multimodal approaches to multimedia involving, e.g., speech recognition, multimedia content analysis, music and audio analysis, user-contributed. Each year MediaEval ask for task proposals. Each task consists of a goal (e.g., social event detection, emotion characterization, estimating geographical coordinates of multimedia items, etc...), data and evaluation methodology. MediaEval contributed to the WP3 test datasets given the large size and creative commons license of most of it collections.

Let's now compare these two initiatives. While Gra.fo has a collections of audios that were originally recorder in analogue formats, all the MediaEval data consists of videos that were born-digital. While the Gra.fo collection could become public available in the future, all the audiovisual contents considered by MediaEval have to be public in order for the researchers to perform experiments on them. While the MediaEval community consists of computer scientists the Gra.fo community is formed by humanities researchers. While the MediaEval initiative is carried on by researchers all over Europe, the Gra.fo project is carried on by people working in the Italian Tuscany region. While the Gra.fo project maintains both preservation and access copies, MediaEval relies on the specific task proposers for both maintaining and making available the task collection to the community. While Gra.fo has defined a common metadata schema, MediaEval leave each task to use specific metadata schemas and formats. There is one think that these collections have in common. Both Scuola Normale Superiore and MediaEval are not the owners of the rights on the audiovisual contents they are considered.

Two MediaEval collections were proposed for the Presto4U test dataset. In fact, it was easy to find entire collections with creative commons licenses because of the fact that MediaEval itself prefer to deal with audiovisual contents having these open access licenses.

5.3 *Barriers to the Community's adoption of new technology*

The best-effort approach is very common when considering preservation of research and scientific audiovisual contents collections. The absence of specific obligations and the lack of motivations (researchers do not become popular in their community because they produce or correctly preserve audiovisual contents used by others) are the main reasons for that. At the moment, this best-effort approach results in having audiovisual contents stored in multiple copies in same research institute in most of the cases in the format in which they were produced given that most of them were born-digital.

Given the lack of awareness, we decided that it was important to help CoP members to express their digital preservation needs. To this goal, we organised the webinar "Expressing Preservation Requirements on Audiovisual Collections" that took place on March, 10 2014. The webinar was an introduction to expressing digital preservation requirements in the context of audiovisual collections, with a special emphasis on the approach followed by the Presto4U project. It started with basics on what requirements are, how they are created and which purposes they serve. The webinar then discussed how standards can play a key role in the expression of requirements for digital preservation and exemplified the concept by showing how to use three standards: the OAIS Reference Model, the Ontology for Media Resources and the ISO/IEC 25010 System and Software Quality Requirements and Evaluation SQuaRE – System and Software Quality.

A very important aspect of digital preservation is appraisal, i.e., the process of evaluating records to determine which are to be retained as archives, which are to be kept for specified periods and which are to be destroyed. In the context of this CoP, we found that appraisal of each audiovisual is not only difficult but often useless. It is largely accepted that appraisal should be done at level of homogeneous collections. It is typically not difficult for researchers to identify atomic collections considering their usage in the literature. As an example, all the videos used for a specific research should be kept or destroyed as a whole. It happens that large collections are used in parts. In this case, more atomic sub-collections could overlap.

We believe that free (at least for nonprofit organizations) complete software solutions to the preservation of audiovisual contents associated in combination with cost-effective hardware infrastructures would be the perfect solution to the digital preservation of these audiovisual contents. Probably, they would be easily accepted by the community given that they would not change consolidated solutions. Thus, the community is ready to adopt standards but only in presence of cost-effective solutions. Moreover, efficiency of the solutions is more relevant with respect to effectiveness.

A completely different approach would be to have centralised repositories, at the European level, for scientific audiovisual contents. In this case, the maintainers of the repositories would have a mission on preserving the audiovisual contents. Moreover, digital preservation would be carried on by specialised professionals. The major barriers to this solution would be the willingness to contribute to this repository by the researchers. Even if it would be possible in particular cases (e.g., European projects) to force the researchers to send the audiovisual contents produced to the central institution, we believe it would be very hard in general. Thus, this solution could help, but would not mitigate the need for cost-effective solutions for researchers and institutions that would prefer to maintain their collections their own. In other words, as for music, we could imagine “private” and “centralised” collections to coexist.

5.4 Connection between the Community and suppliers and vendors

Many researchers and some institutions with audiovisual contents relevant for scientific researchers would like (please note that they have no obligation on that) to preserve their audiovisual contents but they have very few resources for that. Moreover, their main focus is and will be on using them for research and make them available given the growing importance of open data in science.

In order to make the connection with the suppliers, two main aspects should be taken into account. First, the suppliers should present cost-effective solutions. The research and scientific collections maintainer will hardly complain about missing functionalities but they will prefer simple and intuitive solutions. Second, there must be an effort to find resources. It is very unlikely that researchers will pay for preserving the audiovisual contents they are producing out of the period in which they will perform experiments on them, if not obliged or founded by a specific project or initiative. Open sources and free overall solutions would also be much appreciated by this community but only if the knowledge and time needed to use this technology are considerable low.

The size of the collections considered in this project is another important aspect to take in consideration when trying to connect with the suppliers. In fact, in this CoP the collections are small and spread. The combination of small size and scarcity of resources makes these collections almost irrelevant for big private suppliers. Moreover, the time spent to discuss issues and solutions with researchers that have no specific knowledge regarding archives and long-term preservation can be huge. While open source and free solutions are much appreciated by this CoP community, the lack of specific knowledge and time for understanding and assembling it is a major obstacle to their adoption. This community would probably prefer professionals to suggest and maintain open source based solutions for their preservations needs.

Another opportunity for making the connection with suppliers could be the involvement of the suppliers in research projects. In fact, in the context of the European projects there would be resources and time for understanding each other. Suppliers, could guarantee long-term preservation of the video produced during the project, while the researchers would not have to deal with managing the audiovisual contents. European commission should probably consider long-term preservation of audiovisual contents produced in EU funded projects as an important aspects of the proposals as well as already is for open access to research data.

Many universities and research institutes have already established powerful computer centres. However, they typically have not specific functionalities for audiovisual contents. Thus, most of the collections we got in touch are maintained on specific hardware and software. A connection between the computer centres of research institutions and audiovisual digital preservations suppliers could allow these centres to become usable for the audiovisual contents preservation.

5.5 Recommendations for the future of the Community

While the CoP is very much diversified and has very limited interlinks, there are various needs and peculiarities that are largely shared by the members. Thus, it was possible to formulate general recommendations. We received a very good feedback from the few members that were active in the community with respect to the tools available through Presto Center. In particular, the community members liked the amount of information available through the library and standard registers. They also were interested in different level of technological content. There are in fact researchers with high technological skills (especially the ones involved in computer science) but also researchers that require more high level documentation. A unique central point of access to information, standards, and tools related to digital audiovisual preservation is very much appreciated given that our CoP members have no time and interest in surfing the web searching for specific solutions. Moreover, the CoP can significantly benefit from the best practice that CoPs with much more experience in digital preservation have.

After discussing with the members we found that the main focus of the community is on storage. Cost-effective storage solutions would be much appreciated. In fact, the amount of information already produced is too large for existing solutions used by the members. There are initiatives as MediaEval, that is considering destroying some collections because of the lack of, or lack of information about, cost-effective solutions. Preservation and open data should be considered as two faces of the same coin. Thus, any storage solutions should preferable allow online access. Cloud services would be probably the best for this community. However, it is not easy for research institutions to pay and rely on private services. It would probably be hard for this CoP members to pay an annual fee. It would be preferable to pay a fixed amount during the life of a research project for a services that will continue also after the end of the project. For instance, a 3 year project could pay, during the 3 year, the cloud service for storing audiovisual contents for 15 years.

Any market place, as the one developed by Presto4U, and audiovisual contents preservation information and solutions repositories are much appreciated. In fact, the people involved in maintaining the scientific research collections typically have a high level of education and use state-of-the-art technologies but they have few knowledge and scarce interest on digital preservation. Thus, it is typically not difficult for them to understand problems, solutions and best practices, but they have to find them with a much easier tool than a web search engine. Also, it must be taken in consideration the different level of knowledge with respect to ICT technologies that members of this CoP have.

The importance of metadata is crucial for the audiovisual contents considered in this community. However, the high variety of information and research field they are related too and the specific culture and tradition of the various research communities hardly allow a general metadata schema to be adopted. We expect each research field to have its own metadata, schema and vocabulary in the future. Any standard metadata schema existing or produced in the future will be hardly accepted by even some of the members of this community.

It is not clear if in the future scientific research collections, especially the ones produced in the context of research projects, will be maintained by researchers or by some national or international institutions or initiatives. Open science and its focus on open data could help on having collections aggregated on hub repositories. However, we will have probably to deal with some kind of “private collections” (the ones maintained by single researchers or small groups) and some sort of “scientific data archives” that will include audiovisual contents. While the private collections will have issues related to the use of cost-effective solutions and lack of preservation awareness, the archives will have to convince researchers to upload and share their data.

There is a huge amount of audiovisual material spread over a large number of research communities and institutions. There is also an enormous number of research papers that present results obtained using these audiovisual contents. However, the conditions under which they are kept are not adequate. The lack of resources, equipment, obligations and expertise will result in losing of most of them in just few years. It is very hard to predict how much will cost, in the future, to produce new audiovisual contents that could have been useless if the ones produced today would be still available. It is even more difficult to understand how many of them are unique and will be no recordable again in the future. The focus for improving the quality of the scientific research has been, in the last few years, in open science. However, it is clear that the quality of future research also rely on the preservation of data that nowadays is available and sometime open, but that could be lost in just a couple of years.

We believe that there is a growing need of centralised and trustable source of information regarding best practices, standards and tools related to audiovisual digital preservation in this research community. While there are many researchers able to understand and achieve digital preservation goals, they preserve their audiovisual contents with a best-effort approach. Having few resources in order to preserve the videos they produce for short-term research, any help given in order to find best solutions for their preservation need will result in better preservation of EU audiovisual contents research data.

6 Footage Sales Libraries

6.1 *Introduction to the work done, general challenges and progress*

The Footage sales libraries Community of Practice gathers professionals coming from commercial audio-visual archives, that exploit commercially their audio-visual holdings by selling and licensing clips and footage for use in all forms of media productions.

This community spans from big broadcaster sales division to large, medium and small stock footage companies that could be specialised in niche topics. These companies, which started to flourish in the beginning of the '80s, today generate revenues for more than \$400 million per year.

Members of this community usually play a dual function: they primarily sell clips, but at the same time they act as an archive, being therefore obliged to practice some kind of preservation activities, if they want to continue to exploit content in the future.

Despite this variety of players, professionals involved in this community share commons concerns and face common problems related to the digitisation, storage and preservation of their audio-visual holdings, often still kept in analogue format (both on film or tape). These concerns and problems are largely shared also with members of the Broadcast, Film and Video production communities.

The main objective of this Community of Practice has been to establish a core group of experts coming from the footage sales domain in order to:

- clearly identify shared major concerns and issues related to the digitisation, storage and preservation of audio-visual holdings;
- raise awareness and improve the adoption of audio-visual preservation research results;
- encourage the adoption of best practices and standards related to digitisation, description and long-term preservation of audio-visual assets;
- help all the Community members in extending their knowledge of the methods, tools and services they need to preserve their digital collections.

The activities of Community building, started in the first year of the project, have been continued targeting mainly the FOCAL International⁶² network members.

FOCAL International, which is the International Federation of Commercial Audiovisual Libraries, represents most of the stakeholders in the footage sales community, gathering together more than 300 companies and individuals involved in stock footage sales, media production, assets management, film restoration and post-production.

Since the very beginning, we decided to collaborate closely with FOCAL in order to recruit our core group of Community experts and to raise awareness on the project objectives and activities.

During the second project year, the core expert group continued working towards the objectives mentioned above. In particular, to facilitate the internal communication, a Google+ community space has been set-up in order to offer an online tool through which keep an open workspace for the experts group. Despite the intentions, this community space has not been as effective as originally supposed. The community members felt more comfortable in direct communications with the community leader, rather than in online coral exchange of information.

⁶² <http://www.focalint.org>

This attitude highlighted one of the main challenges encountered in the community building process. In the footage sales context, in fact, most of the stakeholders operate on a commercial and revenue based model and market competition issues tend sometimes to affect the effective willingness to share knowledge and best practices and start an open collaboration. Members of this community have proved sometimes to be reluctant in discussing (in front of other “potential” competitors) internal problems or outstanding issues related to their digital preservation practices.

This explains why the expert group activities have been slow to start and experiences and best practices in digital preservation have been not always easy to share between members of this community.

Despite these difficulties the expert group gathered and contributed important information to the project through answering to an online questionnaire⁶³ on the PrestoCentre website. The questionnaire aimed to gather a series of information on the current state of digital preservation in each of the communities.

Exhibit 14 Screenshot of the online questionnaire

The expert group also gave feedback to WP3 and WP4 replying to surveys related to the "Recommendations for Standards and Trusted Audiovisual Repositories", providing a list of most used standards in the Community regarding AV digitisation and preservation, and to the "Recommendations on Rights Technology", listing some specific rights scenarios for the footage sales archives.

The Community leader, in consultation with the expert group members, contributed also to the analysis and feedback regarding the new PrestoCentre - Marketplace area of the website and contributed to the production of the “Economic Impact Analysis” (D6.3) and the “Longitudinal CoPs Impact Analysis” (D6.2), reporting the Footage Sales Libraries community point of view for these documents.

⁶³ <https://www.prestocentre.org/questionnaire-footage-sales-libraries>

Regular consultations with the other related Communities (Broadcast, Film archives and Video post-production) have been established in order to better coordinate each community building and to optimise efforts. As a result of this collaboration a joint workshop on “Digital AV Archiving Workflows; Digitisation, Ingest, Preservation, Conversion, and Delivery”⁶⁴ has been organised in September 2014 and hosted by the DFI in Copenhagen. The workshop was a good opportunity to share experiences and best practices between communities.



Foto: Thomas C. Christensen

Exhibit 15 Footage sales CoP leader presenting at the Copenhagen workshop at DFI

The CoP expert group and the broader community also gathered face-to-face for another physical meeting in July 2014 during the FOCAL training week in London. During this event, the project achievements have been presented to the participants and a survey on digital preservation strategies and practices, in the form of interviews, has been submitted to selected community members (Sky News, ITN, Imperial War Museum, BBC Motion Gallery).

The Community leader has presented a poster and submitted a paper on the Presto4U project at the CIDOC international conference⁶⁵ in Dresden on the 8-9-10 of September 2014, in the strand “Digital Long Term Preservation”, in front of an audience of more than 300 attendees. The submitted paper has been also published in the conference proceedings.

On the 18th of September 2014 in Riga the community leader has given a presentation at the BAAC (Baltic Audiovisual Archival Council) annual conference⁶⁶ on the Presto4U project.

⁶⁴ <http://www.dfi.dk/FaktaOmFilm/European-Film-Gateway/Presto4U.aspx>

⁶⁵ <http://www.cidoc2014.de/index.php/en/>

⁶⁶ <http://www.baacouncil.org/conference-2014>

The dissemination activities also took place online through the production of a quarterly newsletter of the CoP, which has been regularly published and mailed to a selected group of about 300 individuals/institutions in the footage sales domain, using also the FOCAL communication channels. The newsletter has been an effective tool for raising awareness about the project activities and more specifically about digital preservation practices.

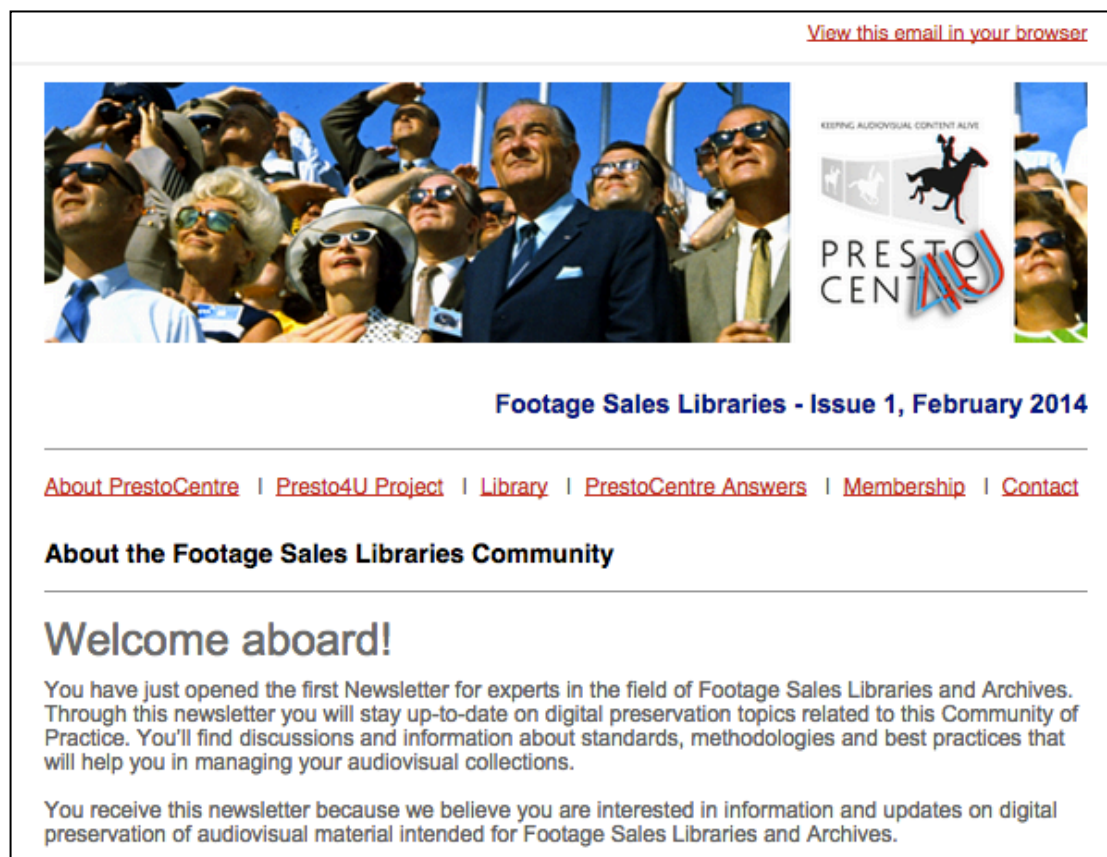


Exhibit 16 Screenshot of the first issue of the newsletter

It has been structured with permanent sections about Presto4U events, like workshops and webinars, PrestoCentre library highlights with links to relevant articles and publications on AV digital preservations themes, with updates on the project outcomes and with news from the expert group activities.

In the second year of the project also new interested stakeholders have been invited to participate to the expert group activities and events (namely British Pathé and the Huntley Archive).

6.2 The Community's long term digital preservation needs

The digital preservation needs of the community have been gathered by the Community leader and the expert group, starting at the end of the first project year and throughout the second year, using an already mentioned online questionnaire, accompanied by interviews conducted during the FOCAL training week in July 2014. Stakeholders like ITV, SciencePhoto, Sky News, ITN, Imperial War Museum, BBC Motion Gallery, INA and Istituto Luce have been consulted. The questionnaire and the interviews were structured in collaboration with WP3 and based on the Knowledge Schema⁶⁷ defined at the beginning of the project. In the paragraphs below we will give an overview of these findings.

⁶⁷ Deliverable 2.1 CoPs Knowledge Schema

As mentioned above, footage libraries community spans from big broadcaster sales division to large, medium and small stock footage companies. Because of this variety of sources, business models and attitudes towards digital preservation can vary strongly and two basic sorts of footage sales entity can be roughly identified:

- A first group is identified in all those stakeholders that act as memory institutions. They are mostly public-funded companies and for them footage sales is a side activity, rather than core business; *Istituto Luce* and audio-visual archives like *INA* or *B&G* and the *Imperial War Museum*, they all do footage sales, but not as their central activity. They are public service companies and their mission is both to enhance the audio-visual heritage and to ensure its access for future generations. The long-term heritage preservation could not be necessarily a legal obligation, but it is at least mentioned in their statutes and, as institutes supported by public funding, they have a “moral” duty of dealing with it. A problem with the overall institutional business model is connecting the profit from footage sales back to the archive whose existence creates the possibility of footage sales. In large institutions, from the *BBC* to film institutes and museums, the footage revenues are not necessarily fed back to the archive, because 'archive' and 'sales' may be in very separate departments of the institution. This situation works to the disadvantage of the archives, particularly in public service and non-pure commercial entities, which could have few resources available to invest in preservation activities.
- The second group (and the larger one) is represented by purely commercial footage collections. Sales are their core business and they exist only because they can sell their footage. Companies such as *Getty Images*, *ITN Source*, *Sky News*, *Reuters* and *Associated Press* are completely different from the previous group. Keywords for them are cataloguing, fast access and availability, whereas everything has to be functional for the daily news production. Not having a public function, they are basically market-driven with a very pragmatic approach to the content preservation policy.

Both these kind of organisations must dedicate substantial resources not only to transfer and storage technologies to keep and exchange moving-images, but also to cataloguing and describing their footage, so that it could be easily searched, providing customers with systems for preview and select the material. Archives recognize the value of adopting systematic descriptive metadata and optimizing their audio-visual resources for fast search and discovery. Making content easily searchable and findable it's crucial, otherwise the whole exploitation process becomes lagging. Developing an internal information retrieval system, which index the hand-made descriptions made by cataloguers, is often considered a good investment of resources.

Analogue formats on films and videotapes are still commonly used, and that's why most of the community concerns are shared both with Film archives and Broadcast CoP. It turns out that for many of the footage archives that holds films, the preferred preservation master is still considered the 35 mm film: whereas most of the archives come from the analogue world, film preservation, compared to digital technology, it's considered safer and cheaper. In addition, it still persists among professionals, including many of Film and Filmmakers CoP, the belief of the superior quality of film over digital.

A large part of footage content is also stored on analogue tapes and there is a digitisation need for all those obsolescent formats that are in a decay state or in danger of becoming unplayable due to the disappearance of playback machines. Considering the great variety of old carriers to take into account, implementing a well-structured digitisation plan can be a difficult task. Costs may vary depending on the source material and on the purposes (for preservation or for access), and in all cases digitisation will represent one of the biggest voice of expenditure for an archive.

Restoration costs should not be underestimated either, as they heavily depend on the type of support, its state of preservation and the amount of restoration desired. This latter choice has ethical as well as economical implications.

The digitisation process is at an advanced stage, but more for access or selling reasons than for optimal preservation purposes. In this domain digitisation is really a customer-driven activity and often quality requirements are just those sufficient for the distribution and sale of the content, making not always meaningful to consider and apply long-term digital preservation practices.

A special attention has also given to media rights management tools and to the proper use of metadata related to Intellectual Property Rights (IPR). These tools are key assets for content exploitation, as footage sales operations only exist in case content has clear rights ownership.

All these considerations indicate that the digital preservation is not yet listed in the highest priorities of the footage sales archives and it's not the first issue on which they typically invest resources. Most of the institutions in this community can easily recognise the importance of investing in systematically cataloguing their audio-visual assets and also in digitising them in order to provide easy and fast access to customers, but investments in long-term digital preservation are not seen as a real priority yet.

The main digital preservation needs, which can be extracted from the information gathered in the community and from what has been summarised above, are listed below. The first two are more general needs, but really important to put digital preservation high in the agenda of the footage sales institutions. The others are instead the more commonly reported specific needs.

6.2.1 Awareness raising activities

There is a strong need to educate and raise awareness about the importance of digital preservation practices in most of the stakeholders of this community, especially among top management and decision makers, in order to convince them to put on the agenda long-term digital preservation investments that have been till now neglected in most of the commercial archives.

6.2.2 Training opportunities

Especially between the medium and small footage sales company, which represent the largest part of the community, usually there are no dedicated internal resources with special expertise and technical skills, able to design, set-up and implement digital preservation plans. There is therefore a need for training in digital AV file formats, metadata and assets management and digital preservation management (including migration, delivery and storage), especially taken into account the fast evolution of technologies and tools in this domain.

6.2.3 File formats

The choice of digital file formats is a crucial activity for footage sales workflows and it is fundamental also for any digital preservation activity. In the community there is a need for standardised open file formats (both codec and wrapper formats) to be used in the production, migration and delivery workflows and there is also the need for guidelines in the choice of long-term preservation file formats. Actually the community is often linked to proprietary formats, like Apple's ProRes, and standard open formats with lossless compression are very rarely used, making very difficult to implement effective long-term digital preservation plans.

6.2.4 Reliable storage solutions

Digital video assets demand lots of storage space, and especially within constantly growing archives (like the ones of current news footage sales services) there is a need for reliable, flexible and scalable solutions for storing digital video. With the booming of cloud-based storage services, technical solutions seem available, but there is still the need for guidelines in choosing, configuring and managing these kind of services, taking into account also issues of security and integrity of data, especially on the long-term.

6.2.5 Metadata standardisation

As mentioned in the paragraphs above, metadata play a central role in the exploitation and re-use of AV content in this community. To effectively access, exchange and preserve video assets, there is a need for standardised and interoperable metadata (both descriptive, technical and rights-related). There is also the need, when feasible, to automatically extract or produce these kind of metadata to save time and resources in the production, delivery and preservation workflows.

6.3 Barriers to the Community's adoption of new technology

As already stated in this document, one of the main issues faced by this community is the lack of sensibility regarding digital preservation practices, which still have a lower priority in terms of investments compared to access, exchange and delivery of AV digital assets. This could be considered the main barrier in the adoption of new digital preservation solutions for the whole community.

The footage sales community doesn't yet consider digital preservation as a high priority issue. The market driven and revenue-based approach of the stakeholders in this community make them focus more on topics like internal digital assets management systems, extensive production and use of descriptive metadata to classify the content and access systems to support the footage sales. The challenges of digital preservation are often seen –wrongly– as long-term and non-vital issues that do not directly impact the daily operations of the commercial archives.

When also crucial activities, such as digitisation, still remain mainly customer-driven and often quality requirements are just those sufficient for the distribution and sale of the content, it is clear that the main barrier is not simply technological (i.e. the choice of the right tools or best practices and their implementation), but cultural and it has to do with the need of awareness regarding the importance of digital preservation for the long-term sustainability of any business model in this domain.

Also the adoption of standard open formats for digital video files is often postponed or ignored just to follow the customers' actual requirements, which are functional to the daily exchange and production of video assets and not to long-term preservation aims.

Of course, there are big differences in the community, when it comes to the adoption of new technology solutions. The big footage sales divisions usually have internal IT departments that can follow the technology developments and implement or apply more easily new solutions to the internal workflows. This is not the case for small stock footage archives that have limited resources and internal knowledge to experiment and invest in issues that are not directly related to the day-by-day operations.

In both cases, stakeholders in this community should be, first of all, convinced with concrete examples and case studies of the return on investment when implementing long-term digital preservation plans.

6.4 Connection between the Community and suppliers and vendors

In a commercial and competitive environment, like the one of footage sales, establishing relationships with specific vendors or technology suppliers could be tricky. There is a great variety of such vendors in the market, and the expert group found that direct contacts are neither an efficient nor a correct way to establish a stable connection with technology suppliers.

This brokerage role, in order to establish a link between technology solutions demand and the supply side, has been realised by the project at large in the PrestoCentre website, where in November 2014 has been officially launched a “Market Place”⁶⁸ area.

The screenshot displays the PrestoCentre Broker BETA website. The header includes the PrestoCentre logo and navigation links: Membership +, Library, Services +, Calendar +, News +, About Us, and Contact. The main heading is "PrestoCentre Broker BETA". Below this is a breadcrumb trail: Home » Services » PrestoBroker (beta) and a search bar. The central content area is titled "Your request to the PrestoBroker" with a subtext: "Use the drop-down menus to select your tool requirements and send your request when you are done." The form is titled "Hello PrestoBroker," and contains several fields with drop-down menus: "I need a Commercial Type tool with software aim for Software Functional Type", "I plan to use this tool for a Tool Type usage on a Platform Type platform.", "The audiovisual lifecycles I want is/are Audiovisual Lifecycle", "The tool I am looking for must be for a Domain Type usage, ideally with a License Type license type and a TRL level >= TRL Level", and "Lastly, the tool has to be compatible for Model Type". At the bottom of the form are three buttons: "Show preferences", "Reset Form", and "Send Request".

Exhibit 17 Screenshot of the PrestCentre Broker page

⁶⁸ For more information refer to Deliverable 4.7 “Market Place”

In this area, together with a Standards Register and a preservation Tools Catalogue, is offered a Brokerage service that can map automatically digital preservation needs to the products and solutions that are present in the Tools Catalogue and Standard Register mentioned before, suggesting the best matching solution.

This is an advanced tool that could be improved and fine tuned constantly in the future and that could provide an effective and scalable way to propose technology solutions to community stakeholders, putting them in contact with the supply side in a faster, more neutral and effective way.

6.5 Recommendations for the future of the Community

The Presto4U project has offered the first concrete and organised opportunity to raise awareness on digital preservation practices in the footage sales community. There is still a strong need to promote knowledge exchange and best practices in the field also beyond the project's end, even if this first experience in building-up a community of practices has showed that this is not always easy in a competitive environment like the one of footage sales. Anyway, despite the contribution made in the Presto4U framework to promote this awareness action, this has been handled mainly through online means. The expert group members would really welcome the opportunity to organise in the future more face-to-face workshops and meetings that have demonstrated to be more effective than online-only communications, both for the core expert group and for the broader community.

Also training opportunities are still highly requested and also in this case the general impression is that webinars, like the ones successfully organised in the project framework, should be also integrated with physical workshops in which stakeholders can meet-up and more easily share experiences. A special attention should also be given not only to technical but also to organisational and economic aspects of the digital preservation workflow. As stated in the paragraphs above, there is the need to persuade the decision makers to invest in digital preservation practices and probably the best way to do this is through showing them the long-term business benefits in the adoption of such practices.

In addition to awareness raising initiatives, also semi-automated brokerage services, like the PrestoCentre Broker, could help stakeholders in solving many digital preservation implementation issues, especially in the initial phases. Tools that help putting together digital preservation needs and the technology offer, coming from the industry or research in this field, will be an interesting thing to explore and offer to all the community members. Such tools have been developed in Presto4U only towards the end of the project and so there wasn't really the opportunity to fully test them and disseminate them to our communities. These brokerage services are considered of high importance for all the community members, and the expert group is strongly convinced that tools like these could acquire a relevant and effective role for the actual implementation of digital preservation practices. For this reason we hope that these services will be maintained and constantly updated also after the project's end.

7 TV, Radio and New Media Broadcasting

7.1 *Introduction to the work done, general challenges and progress*

The broadcast CoP is rooted in the Presto-history of projects. Many project members are active members of various working groups in the domain, such as the EBU's working group on Quality Control (RAI), FIAT/IFTA's Preservation and Migration community (RTVE, Ina, ORF, Sound and Vision) and IASA's Broadcast Archives Section⁶⁹ (Sound and Vision). In 2014, the expert group in the community has come to fruition, set up successful webinars that reached the wider stakeholders and participated in energising workshops at the FIAT/IFTA workshop and the Danish Film Institute.

7.1.1 Tools to manage the COP

The Broadcast CoP made use of the Google Community tool to keep in touch. Frequent meetings were organised via Google Hangouts. Broadcast organisations typically have stringent security measures in place and are therefore less prone to take advantage of social web communication solutions. Members of the CoP used Google Hangouts on private computers in order to be able to communicate. Introductory interviews were made with the CoP members before they were invited to group messaging. The group was kept small, as language differences caused for complicated communications between the CoP members. Notes were taken and shared within the group via Google Docs. News and outcomes were shared and cross-overs created via the EUscreen Basecamp forum, where a specific list of people was addressed who are occupied with taking care of digital assets.

7.1.2 Tools to collate data

The broadcast community made use of the Presto4U questionnaire to investigate the various sources. Questionnaires were sent out via mailing lists, which mostly - due to the size of the questionnaire - led to less qualitative responses than when interviews were held. The CoP leader sent out questionnaires in March and April via related community forums such as IFLA-AVMS and the FIAT/IFTA and IASA networks. The Experts of the CoP agreed to the initiative to providing data and shared the survey among their own contacts. Successive questionnaire efforts in the field are currently being set up by FIAT/IFTA and EBU, which is an interesting development to collate and keep track of.

7.1.3 Tools to disseminate

The Broadcast community had a separate blog on the PrestoCentre website, on which it reported on the PrestoCentre workshop in Paris, and reported on disaster recovery for archives. The Community also sent out two newsletters with news related to the domain.

7.1.4 Tools to grow the community

The community was reached out to via various mailing lists and LinkedIn groups. An effective mailing list was put together of actors in the domain, which had a high opening rate for the newsletters it was sent. The CoP expert group was kept decisively small in order to facilitate the discussion.

⁶⁹ <http://www.iasa-web.org/broadcast-archives-section>

7.2 *The Community's long term digital preservation needs*

Recording the needs of the community happened in a series of intrapersonal steps. The first step was the questionnaire, developed by the knowledge and technical partners and finalised by members of WP2. The second step was the involvement with the CoP Expert Group, who were interviewed face-to-face about the needs they faced in stepping into the digital broadcast realm and bringing trustworthy preservation solutions to them.

Members of the Broadcast group asserted that there is a high overlap of issues with the different domains – approximately 60% of all audiovisual preservation issues were esteemed to be a cross-domain concern. The issues facing broadcast archives specifically had much to do with the environment they operate in. Broadcast organisations are large undertakings with big volumes that need to be put through the archiving exercise and kept available for re-engagement and reuse at top speeds.

The switch to digital production streams has led many of the organisations to re-assess their archive workflows. The digital changes have led to a closer integration of production streams with archive workflows. Archival units at broadcaster ORF for example have been called in to re-teach how people use the archive: the demands glass-fibre connections put on the possibility of recall are much different than those from tape. Producers in the UK have united in the DPP consortium⁷⁰ to align the demands of the people who finally will be storing the materials with those of various independent and in-house production teams. And both the BBC and Sound and Vision have started large-scale in-house change programmes to make sure that programme descriptions are recorded as early on as possible in the production process, to make sure that no knowledge is lost and, more importantly, no double work is done in an attempt to describe the emission post-factum.

In the words of Karen Cariani and Casey E. Davis from WGBH, the challenges posed by digital video can be summed up as:

- Fragility, vulnerability of digital media
- No universally accepted standards or proof of concept
- Digital obsolescence
- Complexity of digital video and audio
- Complex intellectual property issues
- Huge file sizes make storage more expensive
- Storage limitations lead to decisions to compress
- Lack of training among archivists⁷¹

⁷⁰ <http://www.digitalproductionpartnership.co.uk/>

⁷¹ Karen Cariani and Casey E. Davis, "Challenges, Workflows and Insights in the Collaboration to Preserve America's Public Media," accessed November 10, 2014, http://www.slideshare.net/WGBH_Archives/challenges-workflows-and-insights-in-the-collaboration-to-preserve-americas-public-media.

A practice not yet widespread within the domain is making audiovisual archives TDR compliant. Sound and Vision has started a process to investigate how it can apply the OAIS model to a digital archiving operation with the size and throughput of a broadcast organisation (or, in Sound and Vision's case – every national public broadcaster in the country). With this question comes the question what kind of knowledge archivists need in this type of reorganised institutions. The kinds of skills digital archivists / preservationists / digital curators need to possess are less clear-cut today, in which the composition of archival teams is very much in flux, and its demand changing at high rates. One of the experts in the team repeatedly came back to the identified issue that digital storage specialists with an IT background are less prone to be interested in preservationist's discourse, which attempts to bring best practices of documentation and workflows to a highly specialised field. The divide is more visible with broadcast organisations than with independent audiovisual archives, where archival practice is higher on the agenda than in an organisation where IT is organised as a completely separate unit.

A main issue for the community is that while we talk about digital preservation, while production streams have been making the switch, and large operators have managed to digitise their legacy collections, the largest parts of Europe's audiovisual collections are still analogue. Meanwhile, the staff that has spent a lifetime figuring out the technology and applications to handle these formats with, are rapidly being phased out. Many organisations face the questions how to present information about analogue carriers for digitisation for non-trained personnel and how to obtain the material that's needed for their digital transcoding.

In relation to the OAIS model, and becoming a trustworthy repository, and besides this the cost control of large storage decisions, stand the questions surrounding the quantities that come with digital deluge. An archive needs to adopt some measure of how to define and decide what digital-born content it should keep and spend resources to keep it in a guaranteed lasting fashion. A retention plan is more precise than for instance the kind of collection plan the Netherlands Institute for Sound and Vision publicly published in 2013:⁷²

Cloud solutions and outsourcing storage is a recurring topic for the community, in which sinking costs for storage are a necessary evolution to guarantee the storage of the large volumes of materials coming in. Discussions were had about the involvement of storage departments in the types of discussions we had: in many of the larger broadcast operations, storage is safely brought under IT departments, not a part of the archivist's lingo, networks and conferences. Archives experimenting with technologies such as object-based storage for example, are established technologies in the IT domain but rarely, if ever, discussed at archival conferences.

Another important topic for the domain is the variety of quality control solutions, and the level to which human supervision is necessary to be involved in the process. Contemporary projects such as DAVID and PREFORMA investigate the territory of file compliance and essence quality checking automation, and the Bay Area Video Coalition develops open source quality control tools alongside with the A/V Artifact Atlas, explaining budding archivists the varieties of digital artefacts that can exist in smaller and larger digitisation or transcoding processes.

⁷² <http://www.beeldengeluid.nl/node/7445>

7.3 Barriers to the Community's adoption of new technology

The domain for digital preservation is challenging for innovative companies and in a state of constant upheaval. Broadcast organisations make use of large IT infrastructures, provided by the main players in the industry. LTO technology and storage management for example are dominated by Oracle, who in September bought the owning company of the widely used DIVA asset management system,⁷³ and HP. Meanwhile, the community does look at tools such as the LTFS Archiver, of which a 0.4 version is due to come out.

For the broadcast community, as well as for the audiovisual archiving knowledge community at large, it goes that standards produce contested technological configurations – one based on technological innovation, and a frame of institutional integration.⁷⁴ This means that large players with standardised storage processes exist alongside of innovators working with specific niche-market oriented, sometimes open source solutions, that need much convincing internally to be used. Broadcasters being large engineering-based organisations, there is often not much room for experiment outside of the room given in research projects. Meanwhile, there is a large and unsolved gap between the national organisations, large in size and with a history of knowledge building, and smaller, regional organisations that face a smaller knowledge network and less effort to be spent on the challenge of long-term preservation. A research project in the Netherlands in 2012 found that there is a large need for a shared infrastructure, but moreover a need to build awareness of the long-term preservation challenges withing these smaller organisations.⁷⁵

The FP7 DigiBIC project investigated the challenges to successful technology deployment to creative SMEs. The main challenges it identified included:

- The lack of market readiness of outcomes from FP6/7 research projects;
- The disconnection between R&D being undertaken in public research institutes and industry requirements, in particular that of SMEs in the creative industry sector;
- The difficulties in sourcing new market ready outcomes from other national and EU funded projects.⁷⁶

The report indicates that some of these challenges are standard issues when looking at technology transfer to SMEs, but they are certainly at play in a market where IT decisions are taken based on proven worth in the market and off-the shelf solutions are more and more preferred to needs based work-arounds.

⁷³ "Oracle Buys Front Porch Digital," Press release (Redwood Shores, CA, September 14, 2014), <http://www.oracle.com/us/corporate/press/2292209>.

⁷⁴ Zack Lischer-Katz, "Considering JPEG2000 for Video Preservation: A Battle for Epistemic Ground," 2014, <https://www.ideals.illinois.edu/handle/2142/47380>.

⁷⁵ Hans van der Windt, *Verkenning Digitale Av-Collectie NL: Eindrapportage van Een Onderzoek Onder Erfgoedinstellingen Door Beeld En Geluid* (Hilversum: Nederlands Instituut voor Beeld en Geluid, 2012).

⁷⁶ Perrine Hamon et al., *Policy Report: Supporting Innovation and Technology Exploitation in the Creative Industries*, Deliverable (Brussels: DigiBIC project, 2013).

A presentation at the 2014 AMIA conference⁷⁷ specified the take-up of the open source Hydra DAM system. Vendor options guarantee expensive license fees, migration to new versions on the developer's timetable, professional services are needed to access proprietary code and tech support is still needed. With open source solutions, an organisation still needs developers /tech support, but working together with other users means you all need the same basic functions and can add features and functionality based on popular demands. The Netherlands Institute for Sound and Vision on the other hand, has chosen a different direction – in its Next Archive MAM tender procedure, it calls for optimising its MAM situation by replacing the existing platform in 2015 with one integrated commercial-off-the-shelf (COTS) Media Asset Management system.⁷⁸

Jean Varra from Ina gave a compelling overview of archival skills necessary in the current digital age – knowledge of which is needed in the archive in order to make the right decisions about which tools to implement and use. He specified that while traditional roles of handling old media are still required in the archives, these capabilities are regularly decreasing. New roles such as file specialists and monitoring activity and AC control are essential, new roles for AV technicians. Data and storage management have become the central technical roles for digital archives, while people are needed to bridge the different domains of digital publishing, data protection, data mining, post production, et cetera.⁷⁹

Trust for using tools often comes from a long-term working relationship. Research projects have the added benefit that they provide insight into how partners work and approach the seriousness of the archive's problems. This is often a benefit that is stronger with smaller developers. Examples in case are the QC Tools developed by BAVC, which provide video capture utilities using FFMPEG. They are developed in-house and meant to be shareable by the end of the year. Final Cut will change much, frame rate not standardised (abbreviated to 29.97) and it is therefore more handy to control the software yourself. DVGrab development has been abandoned. The Belgian audiovisual archive for the Flemish region VIAA relies on software coming directly from vendors and on LimeCraft tools, which have been developed by a spin-off from the Ghent-based iMinds research.

The tendering process is another possible barrier for research uptake. Public institutions are often obliged to take up a tendering procedure, which does not put innovation solely on the forefront. Organisations can therefore prefer a specific technology, but make choices for proven technologies through the tendering process.

At the FIAT/IFTA conference, Christophe Kummer from the Austrian innovation company NOA indicated that for commercial providers, the archive market is a necessarily niche one, in which companies need to invest in ever longer relationship building, the outcome of which has become more and more unsure: while budgets to invest in technology have shrunk, the demands for what the technology has to be able to do have become ever more complex.

⁷⁷ Cariani and Davis, "Challenges, Workflows and Insights in the Collaboration to Preserve America's Public Media."

⁷⁸ "Kennisgeving van Aanvullende Informatie, Informatie over Een Onvolledige Procedure of Rectificatie: Next Archive MAM -Stichting Nederlands Instituut Voor Beeld En Geluid," *TenderNed*, accessed December 1, 2014, <https://www.tenderned.nl/tenderned-web/aankondiging/detail/samenvatting/akid/b50a58ffebc3a6a7f681a912e0e8817c>.

⁷⁹ Jean Varra, "Evolution of the Technical and Professional Skill Sets and Roles within the Digital Audiovisual Archive Sector," 14:29:45 UTC, <http://www.slideshare.net/flatifta/jean-varra>.

7.4 Connection between the Community and suppliers and vendors

As mentioned in the chapter on barriers to research uptake, a tight integration exists between some broadcast organisations and suppliers, be it through long-term tendering and implementation procedures or through research projects. The role of technological SMEs in the domain is multi-dimensional: often in dealing with the specialised knowledge from the providers, the archives generate domain-specific knowledge and skills that they otherwise wouldn't have had. When one looks for example at the history of the MXF format, the providers of quality control systems have had oftentimes over 15 years of experience that can't be built inside the archive within the period of just a few months.

Within the broadcast realm, therefore, connections between archive management and providers are extensive – through channels such as the IBC and NAB conferences, where MAM systems have been taking up an increasingly important role; through research projects such as PrestoPrime (2009-2012), CineXPRES (2011-2013), DAVID (2012-2015), and PREFORMA (2013-2017); and through domain-specific conferences, such as those hosted by PrestoCentre, FIAT/IFTA, IASA, AMIA and EBU.

Within the Presto4U project, the relationship with suppliers has been intensified through setting up collaborative webinars, in which suppliers talked at large about the development of quality control tools, a much-debated topic within the core expert group, and of the MXF format specifications for long-term storage.

7.5 Recommendations for the future of the Community

7.5.1 Continuing challenges for the take-up of research and technologies

Vendor relations bring a host of knowledge of existing knowledge, as well as an indication of needs that need to be researched and developed upon. The important gaps within the organisations that are outside of this research and networking loop lie in recognising the technological challenges and finding the signal between the noise of conflicting solutions to common problems. The current digital age is bringing with it a lot of upheaval. The largest challenges for archives consist of making sure they have the appropriate skills in house to face an ever-evolving landscape. For the broader domain, the problems are comparable, but solutions ever changing. We need bodies with a strong voice that hold a plea for a strong direction, in terms of format decisions and long-term best practices. The research that has taken place in the series of Presto-projects has led to a number of scalable solutions and a small sample of technological solutions that can be implemented. Several SMEs have specialised knowledge of the field, which is being implemented in various national organisations. Local broadcasters have a harder time to grasp the challenges that digital preservation brings, simply because the challenges themselves are not very well-known. Separating the storage dilemma from the broader best practices of preservation, is not in the interest of larger hardware vendors, yet continue to be massively important to disseminate and share. Successive questionnaire efforts in the field are currently being set up by FIAT/IFTA and EBU, which is an interesting development to collate and keep track of, with regards to keeping track of the digital preservation developments and demands in the domain.

7.5.2 Policy and research recommendations

In terms of research, there is a lot to be gained from collaborating and exploring solutions that extend beyond the borders of specific domains and sectors. Challenges that have been faced by large-scale organisations can hold through for other sectors that use a different type of format. The main challenge that holds true for small and large institutions alike is to balance the costs of maintaining heritage audiovisual materials for a guaranteed long term. Pressure to cut on expenses is seen all across the European continent, but should not endanger the efforts that have been made to realise the safekeeping of both legacy and newly created productions – in whichever way the current productions will be made in the future, in both linear and interactive fashions.

7.5.3 Vision and recommendation to continue the CoP, expert group and activities in the future

Within the Presto4U project, efforts have been put in making sure that the existing domain overlap between the CoPs for video production, footage sales and film archives, as CoPs that are dominated by professional moving image production services, were discussed and recognised. In the broadcast realm, several groups are actively exploring the future of the domain. Innovations in the digital preservation field need to be followed up with clear implementation examples, best practices and – where and if possible – examples of wrong decisions that have led to renewed insights. This sort of dialogue can only be held in a trusted environment, examples of which are working groups and specific commissions.

Preservation is an issue that underlies our every action, but is a highly technical topic that is often left to the experts to solve. A clear indication of what challenges are prone to technology, to business decisions, and to managerial implementation, are needed to give the domain a clear view of how to move forward and ensure long-term, trusted preservation solutions for our audiovisual heritage.

The questions that were discussed in the expert community will after the Presto4U project take place on three different platforms that the Community of Practice leader is involved in, namely [1] the EUscreenXL network, which is a vibrant community of broadcast archives who make their materials available online, [2] the Preservation & Migration commission of FIAT/IFTA, whose activities are focused around the annual FIAT/IFTA world conference and [3] the community effort within the Preforma project, which sets up a community around questions of standardisation and file compliance checking for file preservation. Technology watch and communications with suppliers will be taken up in the Horizon 2020 project InnoCreate, which builds on the DigiBIC network, where Sound and Vision is responsible for technology tracking – and the established liaisons with SME suppliers in Presto4U will be transferred to a vibrant accelerator and business support community. Last but not least, Sound and Vision will further engage with the broadcast community on issues of preservation and innovation through the PrestoCentre platform in the future, whose offerings have been scaled up and made more useful to the AV community thanks to the efforts of the Presto4U project.

8 Personal Audiovisual Collections

8.1 Introduction to the work done, general challenges and progress

Today almost everyone has some kind of digital file to preserve, among which photography is placed on top of the list, definitely at a higher level than audio and video contents. Despite being the largest group of digital file stakeholders in the world, most non-professional people are unaware of what digital preservation or personal digital archiving is and why they should care about it.

Personal Collections stakeholders are not really structured and organised among themselves and can hardly be called with a “community”. Nevertheless they share many problems that are common to other communities, which makes it possible to consider them from a general point of view and to identify specific preservation issues regarding their contents.

Our aim was therefore to analyse this apparent lack of awareness and identify what were the strategies adopted (or to be adopted) in the case of a digital preservation. Due to the fact that *INA* was responsible for managing also the Sound & Music Archives CoP, our goals overlapped to a certain extent, but of course we kept them separately according to the specifications of each community.

We made an in-depth search establishing a list of almost 50 institutions working in the reception of personal audio-visual contents, which later selection resulted in being our core experts group. Starting from this research conducted in the early months of 2013, we got in touch with those stakeholders who were willing to collaborate and selected the so-called “core expert group”, a network of experts with an extensive experience in the field of personal archiving.

This group, formed by a small number of members, represented the core of the requested expertise in the project and has been the privileged interlocutor from which gathering information and feedbacks on the needs of the CoP. Their mission was to communicate any practical problems they incurred in carrying out the daily basis archival tasks, to participate in information exchange with other members of the community and in general to actively participate in any action that could increase the collective experience of the community.

As internal workspace communication, the CoP maintained a Google Community platform where all core experts used to provide updates, to archive reports, and conduct project communications. This platform enabled to access project data and communications at any point in time and provided the ability for core experts and project team members to collaborate well together.

One of the most important tools by which we collected information was the survey tool on the Presto website, the knowledge scheme created by *KCL* and *CNR*.

In other cases it has been instead preferred to work “independently” and, for this reason, it has been proposed to each core members a custom questionnaire, in order to collect specific information to be analysed, matched and compared in the subsequent steps of the project *Presto4U*.

After the identification of experts and the first contacts and discussions, we moved to the phase of the development of the first face-to-face event/"Preservathon" in December 2013, in order to directly share expertise and information between expert members and us. About 80 people attended the organisation of this workshop⁸⁰, which took place in Paris on December 4th within the *INA* premises. The objective of the workshop was to present the outcomes and advancements to representatives of the different communities of the project (including obviously Personal Collections CoP) and hear from them what are their challenges regarding preservation.

In the meantime, at a more peripheral level, a whole world of users and stakeholders exists who didn't participate directly at the development of the project, but being part of the working community, have been involved on several occasions in expertise spreading.

For this reason, in 2014, *INA* proposed and designed a webinar⁸¹ concerning the implications of content contributions and the collaboration between receiving institutions and content holders.

In addition, from January we started a monthly-based publication of newsletters, which dealt with upcoming events, updates and library highlights. This has been an important tool for community building, since there were very little relations among their members. For Personal collections there wasn't even a sense of community, every actor having the vision of doing a very local action.

Many blogs (almost every month) have been published on the *Prestocentre* website, on topics that could be interesting for our community and easily accessible at the same time.

The blogs were efficient tools to keep in touch with the communities, discuss about specific issues, exchange information and advise about relevant news.

In early December 2014 will be held the third and final "Preservathon" event and, of course, we will be present with our community. What *INA* is expecting, is to acquire (and spread) common digital preservation best practices, and to identify problems regarding the evolution of the preservation community, particularly regarding the adoption of new technologies.

8.1.1 Activities of Year 2

Year two was a less active year for the Personal Collections community. During the first year it was relatively easy and interesting to identify original initiatives in the domain, and the institutions or actors active in these kind of initiatives were eager to discuss, share and transmit their experiences. When trying to enlarge the circle in year two, the result was quite disappointing, because while many institutions (mainly national libraries or archives) published openly their interest for personal contributions; when discussing in depth with them it was clear that it was more a declaration of intention than a running activity. The experts came to the conclusion that it was good to show an interest in collecting personal contents, in fact few actors had a strategy and a policy to do it, and whenever somebody would propose or donate contents, institutions would accept them but would not develop an associated promotional activity.

The core group of experts were in fact individuals or institutions, which made a clear policy of their acceptance of contents, making an open publicity for them and merging the contents when possible to their own collections thus contributing to the enrichment of cultural heritage.

⁸⁰ <https://www.prestocentre.org/presto4u-workshop-2013>

⁸¹ <https://www.prestocentre.org/calendar/webinar-how-help-content-owners-bring-their-collections-institutions>

In the domain of personal archiving, meaning the management of individual's own collections of contents; the project witnessed a clear evolution in practice. The consciousness related to the risk of loss is very strong and many new initiatives appeared which were put on the community's blogs and newsletters. Among the most outstanding issues, were the publishing of books and reviews on this practice, with recommendations and guidelines to help any content-holder to advance. Equally important are initiatives growing to provide storage services to users on which they can somehow rely; even if still no archival services are proposed to users, the problem grows at such a speed that it can be foreseen that they will arrive in the future. Some services can be considered as medium term archival systems, however the fact of announcing a service is not a part of the agreements.

8.1.2 Interaction with other workpackages

Little interaction was observed here, no main technical or economic issues. Actors of the community were interested in knowing what was happening around but more from their domain of activity perspective than from the personal contributions issues. As in many communities there is a need for simple effective tools for documenting and archiving, with integrated migration control tools and persistent identifiers, however this could also be a near perspective based on initiatives like Archivematica that could develop at a simpler level.

8.2 The Community's long term digital preservation needs

The ability to create, collect, and preserve personal archives – once privilege of elites – has now been extended to billions of people around the world, and increasing numbers of them are concerned about the long-term prospects of their data. Clearly the concept of the personal digital archive is on the minds of many, from authors and artists to historian and documentarians, and from entrepreneurs to funders of memory institutions. Over the last few years, a common language, shared awareness, and a new field of study centred on personal archives have begun to take shape through the work of a new community of digital archivists. But it has yet to be fully defined or realised and too many people are still uninformed about digital preservation's challenges.

It is therefore important that we create a shared understanding of personal archives, appropriately set expectations about them, and most of all, bridge the gap between our imagined ideal and the imperfect tools and services we use to preserve the data we care about. That will require solving some difficult problems that are interrelated in complicated ways.

Five major issues stand out and we'll try to sum them up under these macro categories:

1. *Technology obsolescence*
2. *Lack of necessary skills*
3. *Funding and costs*
4. *Documentation*
5. *Rights managements*

8.2.1 Technology obsolescence

These kind of issues are in no way unique, and therein lies a problem that plagues individuals just as it does institutions: obsolescence. Preserving our heritage is not as simple as saving the files to a disk once for all. It is a constant process. Digital records look more like an oral transmission than a physical document: if we don't copy them regularly – with refreshing and migration practices – they simply disappear. On the other hand, for all that concerns analogue carriers, a foresighted preservation practice requires saving the originals. Films do not need elaborate storage solutions to remain viable for many years⁸², but we need anyway to keep them in a cool and dry environment and house them in containers that allow them to “breathe.” Archives and libraries have specialists to do this; families have to rely only on themselves for keeping their analogue and digital files viable. That's a difficult task for non-professionals.

For many people preserving the integrity of storage device is a tough task: disk can clearly become damaged because they are not designed for permanence; hard drives can crash; flash storage memories can get lost. Even if a person is able to safeguard the storage device itself, there is still that threat of obsolescence, because storage devices last just a few years.

It can be said that the life of storage media depends on at least three factors:

- 1) *Media durability* - Storage media devices vary in how long they last. The technical quality of individual media carriers differs widely. The following estimates for media life are approximate; a specific item can easily last longer or fail much sooner:
 - a) *Floppy disk*: 3-5 years. Though no longer made, many still exist.
 - b) *Hard drive*: 2-8 years. The health of a spinning disk hard drive often depends on the environment; excessive heat, for example, can lead to quick failure.
 - c) *Flash media*: 1-10 years. This category includes USB flash drives, SD/SDHC cards and solid-state drives; all generally are less reliable than traditional spinning-disk hard drives.
 - d) *CD/DVD/Blu-ray optical disk*: 2-10 years. There is large variation in the quality of optical media. It must be stressed that “burnable” discs typically have a shorter life than “factory pressed” discs.
 - e) *Magnetic tape*: 10-30 years. Tape is the more expensive storage option for most users – it depends on specialty equipment – but nowadays it's still the most reliable media available.
- 2) *Media usage, storage and handling* - The more often media are handled and used, the greater the chance they will fail; careful handling can extend media life, rough handling has the opposite effect.
- 3) *Media obsolescence* - Computer technology changes very quickly. Commonly used storage media can become obsolete within a few years and therefore impossible to use, even if still in working condition.

It is now clear that all storage media – especially digital ones – have a short life span, where the initial manufacturing quality and its retail cost have a strong influence too. This

⁸² The *National Film Preservation Foundation (NFPF)* provides valuable information on “Film Decay and How to Slow It” on their website, along with the “Film Preservation Guide”: <http://www.filmpreservation.org/preservation-basics>

is why digital preservation requires active management, including regular migration of content from older storage devices to newer devices.

Cloud storage could be a simple and effective short-term solution, but its conservation isn't assured over time. Personal data may be deleted just because our service provider changed his company priorities. They are commercial organisations that aren't always interested in caring with personal collections. When commercial service providers state that they accept no responsibility in case of data loss, they mean it. Commercial organisations, particularly start-ups that promise continuity and persistence over time, are not reliable and assigning the task of long-term preservation exclusively to this type of technology is unwise.

8.2.2 Lack of necessary skills

Content holders want to preserve memories of the past: personal memories, family memories, and even broader historically or culturally significant memories. It's not a new phenomenon: institutional archives and household attics are filled with testaments in the form of papers, photographs, old movies, etc. Thanks to the evolving technology, however, preserving the memory of the past has gone beyond the careful storage and handling of physical material, as more and more people are passing on details of their lives to future generations as digital files.

The problem that arises, however, is that the personal archives typology is increasingly complex. We have efficient and special-purpose recording devices, more places to store things and more things to store. Content what was once transient may now be kept indefinitely, and content that was once personal is now shared via a growing array of social media services. To properly curate them, we would probably need to drop everything we were doing and just devote ourselves to our legacy.

Moreover, to be good personal archivists – even amateur ones – people need to perform curatorial duties, such as creating metadata, assessing long-term value, etc. They need to perform regular and extraordinary IT tasks, everything from normal maintenance including installing software up to thoroughly mastering analogue and digital AV technology. On occasions, they may need to be media type experts too, and make decisions like “Which format is better than another?” To make matters more complicated, the family member who knows how to use a specific software may not be the same person who has interest in personal archiving, and neither of them may be the family member who has the IT expertise to perform everyday system maintenance.

There have always been preservation concerns that individuals and families tend to overlook without education and training on the subject. It's fair to say that vast majority of people need help figuring out how to manage their personal digital collections and to tidy them up for successors. Without the education and specialised training possessed by institutional archives, most individuals are in the position of simply doing the best they can. These trends suggest that public institutions have a role to play in archiving personal belongings: if they don't intervene, obviously with the help of those who have produced this content, there is no way to predict what will survive and what won't.

8.2.3 Funding and costs

Economics is another of the enduring questions surrounding personal archives. Who pays, how much, for what exactly, and why? Archiving has always been driven by the anticipated future value of information, which in the end is based on a guess.

Old home movies depicting scenes and local activities, almost certainly have a historical interest, just for the mere fact of portraying realities that no longer exist. Local historical

societies and researchers definitely consider them real treasures for their sociological, architectural, ethnic and urban studies.

The value of these documents may not stop only at a cultural heritage level, and indeed becoming potential sources of income for the owners. Commercials, filmmakers and TV producers could pay a per-second exploitation license directly to the owners or, in case of public domain material, to the companies that manage these collections. To be fair, it's unlikely that beginners could earn money immediately on their own, but they can nevertheless contact stock footage companies and specialised archives, which, thanks to their catalogue management and a well-publicised preview platform, are able to better interface with potential customers.

Calculating the costs associated with perpetual storage – or very long-term access – is also incredibly difficult. And as the costs of information capture and storage continues to decline, the default course of action is to save more and more. Governments, libraries, archives, and research organisations have collectively spent large amounts of money to develop cost models for digital archives, because an ability to predict costs is essential for any organisation that wants to promise long-term access. Often, these models are too complex for practical use by individuals or small institutions.

What people need are simpler models (such as “pay once/store forever” services) that make it possible to decide what they can afford to save, which will mean getting to commodity prices and to fixed unit costs, particularly for ingesting (talking in and assimilating the data) and its storage. How much does it cost to digitise a defined number of documents? How much does it cost to store a terabyte, forever? These are just some the questions to which we should give clear answers in the future.

The cost of digital preservation cannot be easily isolated from other organisational expenses, nor should it be. Digital preservation is essentially about preserving access over time and therefore the costs for all parts of the digital life cycle are relevant.

8.2.4 Documentation

A common obstacle for new personal archivists is organisation. Professionals have the benefit of rules and standards: the resources used by cataloguers indicate where to find the descriptive information on physical materials or within electronic records. Organised archives are able to find what they are looking for in a collection and locate similar materials using the catalogue.

Unfortunately Individuals and families often have only basic computer knowledge, they don't have standards to follow and, unlike many organisations, do not have enough skills to draw up an extensive documentation of the material in their possession. As a result, a personal archiving project can seem overwhelming and unmanageable.

The potential usage of personal contributions largely depends on the metadata describing the objects. Case studies reveal that there are no metadata or extremely poor metadata associated to personal contents. Manual documentation, even made by experts if there are any available, is very unlikely to be found; the initial production context is missing, people appearing on images or sounds are unknown and there is no information on the film itself that may help the process. This is why documents either are left with no documentation or a very general one (name, year, nature of content) or contributors are asked to make the descriptions based on their knowledge of them.

Content documentation is therefore a major issue: people immediately appreciate the value of storing home movies along with some documentation for the benefit of those who come later, but it is unlikely to go beyond mere names and events and include crucial information that might seem obvious to the immediate family. Metadata is largely an obscure concept to the general public.

8.2.5 Rights managements

Rights are differently dealt if they concern old or recent material. For old material there is a presumption of out of rights situation, even if this is not clear at all. Often content producers are unknown, or there is no way of finding them, so in general donations are considered as heritage contributions that should not generate any rights and should in consequence not be used with a commercial purpose. This is the case for archives wanting to enrich their collections where the legal environment of archives guarantees that no commercial reuse will be done. In other cases there may be a donation agreement, where the author expressly indicates that they give usage of their material to the archive under the express condition that it will only be shown under a certain context and no copies will be made.

In any case copyrights legislation changes from country to country: in the U.S.⁸³, home movies are generally considered as “unpublished works,” and as such are automatically protected for a term 70 years after the death of the author. In the common instance where the maker of the film is unknown, the term is 120 years after creation – so as of 2014, only home movies shot by individuals who died before 1944 could be in the public domain. Most home movies therefore will still be protected by copyright for many years and are *not* in the public domain, although often the mere possession of the document corresponds to a claim of ownership that can hardly be objected⁸⁴.

Concerning commercial uses of personal contributions, this is mainly the case where individual authors cooperate to create a collection of content, which will be used with a commercial intention. This may be the case of broadcasters looking for original footage related to news, which may propose commercial revenues to contributors. In this case a contract is done, establishing the usage context, the revenue share, the artists name or other protection issues. With audio-visual content, one of the objectives of collecting personal archives is to make them accessible; this implies making contents visible online and organizing the viewing and the access to contents within a legal frame. The agreement then should expressly indicate that the donation is likely to be put online for free access by users.

A main concern about personal collections is the authenticity of contents: were they really produced from the donator or are they a copy of existing content? In user-generated content (UGC) websites this is a real concern regarding the fact that a content may be copy protected or under other rights. We find the same issue with those personal contents that are involuntarily reproducing objects or elements under rights (as a painting, photography, music or film). Generally there is a common approach to this issue, even on UGC sites, where content producers certify that, to their knowledge, there are no rights associated to the contents they are sending or publishing.

⁸³ <http://www.copyright.gov/circs/circ01.pdf>

⁸⁴ The *Center for Media and Social Impact* created a “best practices in fair use” guideline for documentary filmmakers, which includes additional guidance on use of copyrighted material: <http://www.cmsimpact.org/fair-use/best-practices/documentary/documentary-filmmakers-statement-best-practices-fair-use>

8.3 Barriers to the Community's adoption of new technology

Most people seem to approach the custody of their belongings with a mixture of benign neglect and unrealised plans to do better. It is clear that public institutions (and also private ones) have an important role to play in archiving personal collections. Between benign neglect and the onerous nature of the custody efforts, it is unlikely that individuals and families will be able to do it themselves. It is also evident that considerable effort still needs to be done in what should be in these collections and what should be excluded. Because it is obvious that trying to save everything, as well as being a never-ending huge task, it is also pointless.

But if we had to choose one thing that over the last few years is generating a growing interest, also thanks to the aggregate power of the Internet, these are the old homemade movies. Homemade films don't hold private meanings just to the people who shot and to those who appear in them. Local historical societies, researchers, cultural enthusiasts, documentarians, stock footage libraries and regional archives may give a value to homemade movies. They are often particularly sought after not merely for study or curiosity, but for use in producing new media such as documentaries, commercial advertisements, or feature films.

Interfacing with this type of activity is therefore doubly beneficial for content holders: on one side an economical value is given to their audio-visual content, and on the other hand the responsibility of digitisation and long-term preservation is thus up to companies that have the technical and economic resources to perform the job, which otherwise would be for the private in most cases impossible.

The typical scenario is that of a content producer – or the inheritor – who donates some audio-visual material to an archive (a business-oriented activity), which takes charge of all or part of the digitisation costs. Content producer then will be asked to sign over a legal agreement with the archive, so that they can put clips from films online on a dedicated platform. The purpose is, given a monetary value of the movie, to sell contents and share the revenues between the owner and the host site.

We encounter film archives that offer free transfer services in exchange for the rights to incorporate footage in their own documentary projects or in their stock footage libraries. Typically, they also ask for the exploitation rights of the footage, so that they can use the footage in their own projects or sell clips from the films to other parties looking for footage of a certain kind for their work. Often, the saved expense of having the films digitally transferred will make this sort of arrangement worthwhile.

By way of example we report two specific case studies - in this case with different purposes - of institutes looking for personal collections: *Nos Archives* and INA's "*Mémoires partagées*".

- *Nos Archives*⁸⁵ - It is the world's first archive of videos and amateur images. The portal hosts more than 18,000 movies in high definition from 1922 to 1984 and an endless repertoire of images that have shaped the history of the twentieth century. The archive created by Cecilia Pagliarani (film director and editor) and Manuel Kleidman (archive researcher expert) consists exclusively of amateur films, such as family ones or travel movies.

⁸⁵ <http://www.nosarchives.com/na-server/html/welcome.jsp>

Becoming part of *Nos archives* with their own films and photos is free, and can also become a potential source of income. Collaborating may give the opportunity to be recognised as author and thus perceive economic rights for all future use made by film professionals, researchers and documentary makers.

The database is freely accessible for consultation and the user licenses are for sale on the site; copyrights are automatically repaid, according to the contract, to those eligible. The basic idea then is to make available audio-visual materials at competitive costs for the production of documentaries and films.

The archive offers, in addition to private photographic collections since 1895, a wide range of amateur films, from 9.5 and 16mm through 8 mm and Super 8 from all parts of the world.

Moreover, *Nos Archives* organises every year a film festival (*Il Gusto Della Memoria*), the first one dedicated to the creation of films with archive footage. The contest is freely open to professional filmmakers and film schools students, with the only rule that the final product must contain at least 60% of images of amateur film taken from the *nosarchives.com* archive. That's definitely a totally new historical and cultural opportunity, which triggers the talent and engages the action in participated, artistic and social fun, across a broad reflection on the personal and common memory of our lands.

- *Mémoires partagées*⁸⁶ - The National Audio-visual Institute of France (*INA*), responsible for the French public memory, started in 2012 a large collection of amateur films. The principle is the following: starting from different themes, *INA* asks users to submit their home movies, which may be of any historical period and shot by any means, whether they come from an old camera or the latest mobile phone. Regardless of the quality of images and open to anyone, the purpose of this initiative is simply to enrich the national audio-visual heritage.

If movies are already digitised, transmission simply occurs via a specific section within the user generated *Dailymotion* platform⁸⁷. On the other hand, in case of analogue carriers (VHS, Super 8, 8mm, or any format that has yet to be transferred), the user is responsible for transferring to digital and sending a copy to the institute. A special agreement was made with *Forever*, a French digitisation company offering special prizes for users digitising for the *Mémoires partagées* project⁸⁸.

Contributors are asked to describe the document, its origin and location so to have a short set of metadata associated to each document. Once the video submitted, *INA* performs a selection of the most relevant excerpts and then contacts the submitters to obtain the authorisation for an online publishing of their contents on a non-commercial basis. Finally an agreement is signed and contents are uploaded on the *INA* website.

Mémoires partagées still continues in the effort of enhancing the collective memory and has published nowadays, compared to thousands of videos received, a selection of over 900 video excerpts in free consultation on its website, some of which will be broadcast on regional television, in cinemas and at cultural events.

⁸⁶ <http://www.ina.fr/themes/memoires-partagees/>

⁸⁷ <http://www.dailymotion.com/sas/inamemoirespartagees>

⁸⁸ <http://fr.for-ever.com/fr/memoires-partagees>

As we can notice, the two previous examples belong to different categories: on one hand we have a more “private” approach, which tends to make profit from the acquisition, to the benefit of both sides; on the other side we have a public approach, less related to economic benefits and more “sensitive” to broad-domain interests.

Both approaches are valid and perfectly viable. Above all, it is important to understand what will be the final quality of the digitisation, the care in its preservation and what are the conditions under which the two parties agree. Private is not necessarily synonymous of short-term profit and negligent preservation, as public is not synonymous of carefulness and reliability over time.

Each case is different and basically donors and receivers can come to an agreement on every aspect, whether it is the digitisation, preservation or exploitation phase.

However, there are a few important questions from the point of view of the donor, like:

- What is the real fair value of the film?
- Who keeps the original carriers? In which conditions and for how long?
- Do the donor has a real overview of the legal agreement signed with the archive in terms of content exploitation?

In this regard, *INA*’s example is a perfectly “institutionalised” case study, where personal audio-visual collections are encouraged to interface with a public body. These types of optimal conditions are not easy to find, and for certain aspects it is an ideal situation, because the company ensures high quality work and long-term outline. But the *Mémoires partagées* project is not concerned, to give an example, in preserving the original carrier. So the problem from the point of view of the donor is not fully resolved, because if he wants to make a different use of the movie in the future, he will have to ensure himself the durability of the original support over the years.

When choosing the destination, the donor should always consider different points of view. And even taking into account all the problems, we may find ourselves in front of a not easily solvable dilemma. For instance, facing the question “Who keeps the originals?” the answer may be obvious: the receiver archive, because it certainly has suitable means for the purpose. And although it is appreciated that the transfer service offers to “archive” our originals for us, that may mean nothing more than storing them in a box in a damp basement. What’s more, if that company goes out of business, they may sell off those archived films as company assets, or throw them in the trash.

A further problem concerns the fair value of the film: some transfer houses may offer free transfers only if they find your material “of sufficient interest” to their project. Archives, historical societies, and other institutions may also offer to make copies for people who donate their films and the associated copyrights. Such an expression of interest might lead to wonder whether the films are of even greater interest or monetary value. It can be difficult to “value” the film material on the open market, but we might reasonably ask ourselves whether a transfer house seeking rights is giving a fair value for them by merely providing transfers.

And finally all the issues relating to the exploitation rights: how will the footage be presented to the public and in what ways? If extensive rights on the film exploitation are signed, in the future we may not have the opportunity to complain if the footage is used in ways that distort the original context.

So we are facing a lot of issues, and often the solutions are far from being obvious. In any case, if we are searching for an archive or institution to which donate material, the margin of choice is wide enough and it's just a matter of understanding the terms by which we engage in the contract.

Some other examples of institutions, initiatives or services that collect home movie material:

- *The Amateur Film Platform*⁸⁹ - The Amateur Film Platform is an initiative of the Netherlands Institute for Sound and Vision (B&G), which houses one of the largest audio-visual archives in Europe.
- *Chicago Film Archives*⁹⁰ - CFA collects amateur and home movies from people in Chicago and other regions of Illinois.
- *The Center for Home Movies*⁹¹ - As stated in their website: "Our mission is to transform the way people think about home movies by providing the means to discover, celebrate, and preserve them as cultural heritage". The *Center for Home Movies* has also transferred several home movie collections to the *Internet Archive*⁹² and welcome donations from anyone who wishes to support it.
- *Home movies Day*⁹³ - It is a celebration day of amateur films and filmmaking held at many local venues worldwide. It is organised every year by the *Center for the home movies* and provide a venue for home movie owners to meet local film archivists, receive advice on storage of their movies, and learn about the advantages of preservation in various formats.
- *Northeast Historic Film*⁹⁴ - Northeast Historic Film collects moving images related and of interest to northern New England, as well as related documents, books and periodicals, annotations, photographs, and technology.
- *Archivio Nazionale del Film di Famiglia*⁹⁵ - This archive is the first Italian organisation dedicated to the recovery, preservation and promotion of amateur film, and the only organisation in Italy that operates films collection all over the country and ensures the preservation of the original Audio-visual document in air-conditioned premises.
- *EYE Film Institute Amsterdam*⁹⁶ - It is the institute for film in the Netherlands. They are always looking for new materials to enhance the collection and it proposes restoration, acquisitions, research and exhibitions of all the donations that considers of public interest.
- *The Stichting Amateurfilm*⁹⁷ - This foundation aims to stimulate the collection, preservation and re-use of amateur film material and to arouse public interest in both historical and modern day forms of amateur film production. They organise and support various activities concerning amateur film in all its varied forms.

⁸⁹ <http://www.beeldengeluid.nl/en/amateurfilm-platform-english>

⁹⁰ <http://www.chicagofilmarchives.org/home-movies/donate-your-home-movies>

⁹¹ <http://www.centerforhomemovies.org/yours/>

⁹² *The Internet Archive* is a non-profit organisation that is building a digital library of Internet sites and other cultural artefacts in digital form. There is a portion of the site dedicated to home-movies from the collection of *The Center for Home Movies* and other home movie contributors: https://archive.org/details/home_movie

⁹³ <http://www.centerforhomemovies.org/hmd/>

⁹⁴ <http://oldfilm.org/content/donatefilm>

⁹⁵ <http://www.memoriadelleimmagini.it/homemovies/>

⁹⁶ <https://www.eyefilm.nl/en/support-eye/donations>

⁹⁷ <http://www.stichtingamateurfilm.nl/english/>

- *San Francisco Media Archive*⁹⁸ - This archive is a non-profit institution dedicated to acquiring, preserving and making available film and related media materials to historians, researchers, filmmakers and the general public.
- *The Walter J. Brown Media Archive & Peabody Awards Collection*⁹⁹ - Currently preserving over 250,000 titles in film, video and audiotape, their mission is to preserve, protect, and provide access to the moving image and sound materials that reflect the collective memory of broadcasting and the history of the state of Georgia and its people.
- *Northeast Historic Film*¹⁰⁰ - This regional film archive and repository collects and distributes amateur film and home movies from the North East region.
- *Texas Archive of the Moving Image*¹⁰¹ - Its collection includes home movies, amateur films, advertisements, local television and corporate productions, as well as Hollywood and internationally produced moving images of Texas.

So, as we can see, archival organisations often have an interest in the preservation of amateur film and may be able to assist people in the transfer, storage, and exploitation of home movie materials. But in case stakeholders exclude the intention of contacting an archive or a transfer facility, little attention is dedicated to long-term preservation, not even having the awareness of the basic issues. Or despite their good intentions, they may or may not actually do anything about it: it is usually a task put off until “later”. This creates an urgent risk, and a crucial need to ensure the long-term preservation of high-value materials that have no natural steward or are otherwise in danger.

Beyond the specific content of their repositories, stakeholders face common issues, such as lack of core skills, and they have the impression that preservation tasks would go beyond their means. There is no preservation planning, if not at a rudimentary level, and there isn't even knowledge about risks associated with typical media.

Online backup storage is gradually taking place as a primary or secondary storage solution, and this is definitely good news, especially since a) data should be backed up in different geographic locations anyway and b) with online backup we don't have to worry about periodic hardware upgrades, refreshing activities and equipment maintenance.

These cloud storage technologies will become increasingly simple to use and when people will realise the value of cloud technology and the easiness of drop-storage, then it will take off.

The downside on the other hand it's still the poor reliability of some archiving services. Commercial organisations like cloud storage providers, in case of data loss, usually deny any responsibility and providers on which we rely may disappear from one day to another, and with them all of our data. Unfortunately this isn't considered yet as a major issue and in people's mind continuity and preservation over time is taken for granted, even if unfavourable conditions are already present – and explicitly accepted – under the terms of the contract.

We will cover the cloud storage market scenario more extensively in the next paragraph.

8.4 Connection between the Community and suppliers and vendors

The strategy for long-term preservation can be "simply" reduced in two steps: taking care of the original films and digitising them. The latter process requires expertise and modern

⁹⁸ <http://www.sfm.org/sfma1.html>

⁹⁹ <http://www.libs.uga.edu/media/donate/materials.html>

¹⁰⁰ <http://www.oldfilm.org/>

¹⁰¹ http://www.texasarchive.org/library/index.php/Main_Page

technology; it can be built up and established in-house, but it's also available from a large number of specialist providers.

Providers of film transfers will make use of a broad variety of technology and may charge a correspondingly wide range of prices for their services. Although quality, used technology and transferring price differ from place to place, there are three broad distinctions between the transfer services:

1. *Basic Service* - In this simplest of arrangements, the film is projected on a reflective surface such as a screen or light-box and re-photographed by a digital camera. Results will vary according to the quality of the equipment and skill of the operator, but can often be quite acceptable for Access purposes, particularly if we need to preview unknown materials before committing to a more costly project. These services are unlikely to handle sound films effectively, if at all, recording sound "off the air" during projection along with ambient sounds, projector noise, etc.
2. *Advanced Service* - Somewhat more specialised equipment is required in order to re-photograph the film directly off the surface of the film, with a camera or digital CCD pointing directly into the projection light rather than at a surface with the projected image. Each frame of film is captured individually, and some systems include light metering that adjusts the exposure levels "on the fly", reacting to fluctuations in image brightness from shot to shot. The captured images are then converted to the desired format and recorded onto the desired medium. Some systems may be able to record an optical or magnetic soundtrack directly off the film.
3. *Full Service* - Professional film laboratories possess a wide range of technology for capturing and converting various media to new formats, including the re-shooting of film onto fresh film stock or 'blowing up' a smaller film format, say 8mm, to a larger one, 16mm. Many of these laboratories have extensive experience working with badly warped, damaged or shrunken films that other services find unmanageable and may also handle a wider range of obsolete formats such as 9.5mm and 28mm film. Such labs also typically have advanced techniques for capturing and optimizing soundtracks.

These broad categories are provided as a starting place for understanding the various options in selecting a transfer service, and do not necessarily correspond to the quality of work we can expect from any one of them. The customer at this stage is responsible to ask questions and seek references or examples of their work before choosing a transfer provider.

To get in touch directly with a supplier and ask them for suggestions, the starting point may be to visit AMIA's Institutional members page¹⁰² and have a look at which member could be the best partner for their own needs.

In addition to the following list of Institutional Members, we may find *The AMIA Supplier Directory: A Global Directory of Services and Suppliers of Audiovisual Media*¹⁰³, an excellent resource intended as a comprehensive guide for anyone working with audio-visual media.

¹⁰² <http://www.amianet.org/resources-and-publications/suppliers>

¹⁰³ <http://www.amianet.org/sites/all/files/Supplier%20Diretory%20-%202014.04.pdf>

In addition, the *Center for Home Movies* proposes an interactive map¹⁰⁴ of transfer houses all around the world. The services included in this list have expressed their support for the *Center for Home Movies* and have agreed to promote the preservationist ethic by (a) insisting upon the return of all original moving image materials to their clients and encouraging their on-going proper care, (b) respecting the Intellectual and Privacy rights of their clients by informing them of any copies of their movies to be retained by the service provider and (c) securing consent in writing for any third-party use of the material.

Regarding all the digital-native user-generated content (UGC), personal collectors can seriously consider the adoption of alternative and certainly more handy storage solutions: the cloud storages. These services are remote platforms whose cost is based on volume and data transfer. Prices have considerably declined in recent years, while the density, speed, and performance have increased.

Nevertheless the storage in cloud providers raises questions about security and poses a number of problems, and even risks. In order to reassure their customers, providers are committed to respect a level of service under a contractual guarantee, particularly in terms of physical storage, security controls, data integrity, backup and recovery of data, portability and accessibility.

The comparison among the suppliers is difficult, because each product has its own characteristics. In addition, each has a policy of protection of data and information processes that are very difficult to control. The three basic elements we should research before deciding on an online backup service are 1) cost, 2) reliability and 3) ease of use. We can temporarily say that the ideal solution, which is simultaneously characterised by low cost, high security and instant access, does not exist at the moment. The right approach is to choose a compromise based on personal needs and the nature of its data.

Consumer cloud storage is still in its infancy and business models are still being invented, so we should take our time and make an informed decision before starting uploading contents. The saying “Don’t put all your eggs in one basket” also applies to personal archiving and we should not make the mistake of storing our digital collection in only one place. No digital storage medium is 100% guaranteed and cloud storage is not an exception. Storage diversity still remains an essential concept and the cloud should be considered as only one of several possible options, possibly a tool that makes life easier.

And one thing is certain: the growth of the volume requirements. Today’s needs represent an infinitesimal amount of volume to be stored in 10 years.

8.5 Recommendations for the future of the Community

Digital preservation is a familiar issue among the world’s leading cultural institutions. But despite over a decade of institutional success in preserving digital files and collections, most of the general public is unaware of what digital preservation is or why they should care about personal digital archiving.

Today, most people, young and old, have some sort of digital files to preserve. They need to know that their digital stuff is at risk of being lost unless they do something about it. One solution is certainly trying to collaborate with public libraries and other institutions to teach the general public about personal digital archiving. The best thing that libraries can do is explain digital archiving, explain how easy it is to safely archive personal digital material, and stress the consequences of inaction: the potential loss of access to valuable digital possessions. We must also simplify our explanations in order to avoid weighing down an audience with unnecessary technical detail.

¹⁰⁴ <http://www.centerforhomemovies.org/transfer-houses/>

The value of personal digital documents, however, is not the only element that ignites interest in personal digital archiving. Managing documents in digital form is different from managing documents in analogue form in many ways. For example, it is easy to create backup copies of an entire personal digital collection and store them in multiple locations.

Digital tools can enable users to sort documents in a variety of ways, which can be useful in organizing and retrieving them. Beyond these technical differences, there are more profound changes associated with digital documents: increasing quantity, a greater need for maintenance, and decreasing control over personal digital documents. From a long-term perspective, personal digital archiving practice is likely to be challenged by many new factors:

- **QUANTITY** - We can get a general sense of the number of digital documents that people create and accumulate daily by simply looking at our own experiences in producing digital materials. Many people consider the management of digital materials a heavy duty. The lack of time and patience to manage large amounts of digital materials as well as difficulties in making value judgments about documents promotes an attitude of benign neglect. In our analogue past the default was to discard rather than preserve; today the default is to retain. The space problem that was formerly a major limiting factor for preserving records has been minimised and may soon be eliminated. Hence the paradox that keeping more of everything becomes a convenient choice, which demands less effort than sorting and deleting files. Keeping information, however, is not the end but rather the beginning of the digital preservation process. So the obvious question is: what to do and how to handle these documents?
- **MAINTENANCE** - Unlike document in physical form, digital bits must reside on a proper device and system in order to be displayed as documents. The necessary dependency of digital content on a supporting technology makes their long-term preservation difficult, since digital technology changes constantly. Inaccessibility of still relatively young digital objects due to obsolescence of format and equipment is a common problem for almost everyone. In order to keep digital documents accessible through the course of rapid technological change, the application of preservation strategies – like migration and storage media refreshing – is necessary.
- **OWNERSHIP AND CONTROL** – Additional problems stem from individuals' lack of control over their documents in a digital environment. Design purposes, policies, and developers strategies may dictate how people interact with their digital documents. For example, in the case of documents created and stored “in the cloud”, individuals are forced to rely on the technology and options employed by service providers, and there are few ways for end users to make their contents independent from the service providers' systems and to keep them fully under their control. There is a good chance that people's digital contents will disappear due to system failure, cessation of service, or a change in terms and conditions of service. In addition, ownership of content created and stored at service sites is not always made explicit. Even after owners have deleted content from the service site, materials may continue to remain in the service provider's data storage. The indefinite ownership and control over personal digital content created on the web could cause many concerns: violation of privacy, infringement of individual property rights, and an unauthorised use of personal information.

8.5.1 Basic preservation actions

Digital preservation knowledge could be distilled and simplified into a few steps and that information would be sufficient to help people get started. Simplifying this message is essential in order to keep audience focused and attentive. The key point that we must communicate to stakeholders is that we can “store and ignore” physical items - such as books, paper photos and documents - under optimised conditions for years and expect that we can access them any time. But this doesn’t work with digital files, because they are dependent on hardware and software to make them accessible. If hardware or software is ignored for a significant length of time, it becomes obsolete and the digital files will become difficult to access. Moreover, each storage medium has vulnerabilities and a limited lifespan. Lack of durability, obsolescence and improper usage and handling can result in loss of access to our files.

Despite these risks, the solution to reducing the threat of digital loss is deceptively simple: organise and back-up. The solution can be reduced to four steps:

- *Locate everything to be saved* – Files must be found before they can be backed up and must be gathered into one place, such as a unique back-up folder on a computer.
- *Decide what to keep* – Select only the files that are important, the ones worth keeping, and delete the rest.
- *Organise the files* – There is no set system for organisation; it just needs to be consistent and predictable to make it easy to find materials later. Descriptive folder and file names help. Descriptive names could be by file types or by dates or some other scheme. It might be created a folder for Audio and a folder for Video, or we might create a folder for everything created in 2013, 2012, 2011 and so on. Any system of organisation that makes sense for us is fine.
- *Save copies in different places and manage the collections* – Most institutions replicate their digital collections in a separate geographic location far from the source collection. In the event of a disaster, the distant backup copy of the collection will be safe, intact and accessible. Similarly, backup of personal files should be in separate locations on at least two different types of storage devices. Every five to seven years, the obligation to transfer the collection to a new storage device, whatever is current, in order to avoid obsolescence.

There is no set frequency of how often to back up, the more often the better. As time passes and storage device grows obsolete, the files that reside on that device become difficult to access. An active role with personal digital collections can keep them safely preserved and accessible; ignoring the collection and it may become inaccessible on obsolete media. It is that simple.

Technology should, in time, automate the archiving process for us and make file backup less tedious. But until the process is entirely automated, we need to do it ourselves.

To summarize the main points for all that concerns the preservation of visual material:

- Identify where we have digital videos – Identify all the digital videos on cameras, computers, phones and removable media such as memory cards, including videos on the Web.
- Decide which videos are most important and which are not.
- Save the highest quality versions of the videos along with a good descriptive information about them.
- Technical file quality is an important consideration for digital video. Videos that are

posted on the Web, for example, are often compressed and have less information than the original version.

- Organise the selected videos - descriptive file names; tag videos with names of people and descriptive subjects; folder structure on the computer.

On the other hand regarding the audio collection:

- Identify where digital audio files are, both physical media and files on the computer, and group them into a single folder.
- Decide which audio recordings have long-term value.
- Check if the used format is still commercially available; if not, transcode audio files and save in an open and preferably lossless file format (i.e. FLAC). This will ensure the greatest flexibility for future use.
- Organise – Individual audio files with descriptive file names; tag files with information about the recording; folder structure on the computer

8.5.2 Conclusion

The actual custody and storage of all this information is very messy, and it is getting more complex as time goes on. A decade ago, most of it was on local storage media, though even at that time there was an important class of information that was housed by service providers. A service provider in some sense shares ownership or use of the data, and it may or may not let the individual even download copies in useful forms. Today, we find more information scattered around the network, in some cases in remote storage offered as a service, but in many other cases it is actually embedded in some network-based system that attends to its housing, structuring, and sharing.

Few or none of these network systems make any meaningful promise to stewardship or preservation, though too often users assume that such commitments exist, in spirit if not in an explicit contract. And, of course, some information remains in discontinued or abandoned services or disappears.

Individual back-up practices vary tremendously, and until the last few years, effective on-going back-up strategies were substantial technical challenges for casual computer users. Now, due to the complexities of information stored in a wide range of independent systems and services and the long-time horizons involved in the records of a lifetime, it is inevitable that at least some material will be lost over the years.

What should be implemented is an active and on-going communication between individuals and Institutions. Essentially, both use similar equipment (computers, software and storage media) and have similar problems: they acquire content, they organise it and they back-up it, and they are both concerned by contents preservation.

The huge growth of personal digital information presents a great opportunity for memory organisations to connect with people. Their synergy would be beneficial for both parties, because archives have an obvious interest in some type of personal digital material to enrich their collections; individuals, on their side, have an urgent need for guidelines, information and effective guidance for long-term practices.

Clearly, there is a vast research area in understanding the nature of these personal records and how they are changing year to year. Pragmatic advices and best practices can be offered to the broad public for dealing with life in the digital world, for ensuring the long-term survival and usability of the electronic records that they create, and the cultural materials that they acquire.

In the future it will become vital to break down the wall of mistrust between two worlds by working directly with people and helping them better protect their personal audio-

visual heritage, also through the creation of special events (temporary exhibit, personal archiving workshops, call for materials, preservation celebration/occurrences, etc.).

The future of personal archives will depend heavily on technologies and services developed for other purposes, particularly for capture and storage. Better timelines, maps, social network diagrams, automatic indexing and data extraction technologies are examples that will probably be developed for other markets but will also be useful to personal archivists. Not long ago, personal archives consisted mostly of written materials, augmented by a few photographs, sound recordings, or home movies. Integrating the many kinds of digital data individuals now collect into a meaningful whole is hard, yet it is clear that the future of personal digital archives will depend on integrating the multiple types of data we create, collect, and disseminate through our daily activities.

9 Film Collections and Filmmakers

9.1 *Introduction to the work done, general challenges and progress*

The Community of Practice for film was well established as the project entered its second year. The core expert group predominantly includes staff from medium sized film archives and a few independent technical capacities from post production and academia. In general the community has been better at attending physical meetings than using the Google community platform and also the response to online tools and questionnaires has been less satisfactory, though within range of expectation.

The core experts are:

- Barbara Fluekiger, University of Zurich, Switzerland
- Camille Blot-Wellens, Sweden/France
- Celine Ruivo, Cinémathèque française, France
- David Walsh, IWM, UK
- Giovanna Fossati, EYE, The Netherlands
- Lars Karlsson, SFI, Sweden
- Martin Koerber, SDK, Germany
- Mikko Kuutti, KAVI, Finland
- Reto Kromer, Switzerland
- Thomas Christensen, DFI, Denmark (CoP leader)
- Ulrich Ruedel, BFI, UK

9.1.1 Objectives

One of the main objectives of the community has been to establish best practice and research needs in the field of digital film preservation; including long term digital preservation, file formats and digitisation. During the project there were major changes in technology and business models for the community, and the transition from analogue to digital technology is still a major challenge for the community in the years to come.

For the Film Community, the project coincided with a time of digital maturing in the film archives and film heritage institutions. While cinema has been produced digitally for more than a decade it was not until 2011 and 2012 that the entire cinema chain, from production to screening, became dominantly digital. The urgency, and sometimes panic, in dealing with digital (master and duplication) elements is being addressed with implementation of mature storage solutions, even if financial models and long term sustainability is still a challenge in many places. In a sense, the technology is less of an issue today, but the financing and practical implementation is still lagging behind.

The public film archives hold the greatest numbers of theatrical moving image collections in Europe. But while these institutions are obliged to collect, preserve and provide access to their collections, they only rarely possess the commercial exploitation rights. EU and national copyright legislation typically gives exceptions to these institutions to allow for duplication for preservation purposes, but provisions for access and distribution are limited.

Collection building and enrichment takes place through voluntary and compulsory deposit, such as legal deposit of nationally subsidised and produced films. The preservation target is perpetuity (100+ years) and is based on the highest possible master quality (equivalent of analogue film negative, currently uncompressed DSM¹⁰⁵ or DCDM¹⁰⁶) and the best distribution element (currently DCP¹⁰⁷ or HDSR). Although film production companies and creators have a vested interest in their films being preserved, they typically show greater interest in the immediate distribution and exploitation. An engaged stakeholder community exists in the laboratories and facility houses, which produce the masters and create the deliverables for preservation and distribution.

Very high production costs are involved and theatrical films are typically of very high quality and production value. In digital terms, this means that theatrical films have specific preservation demands, which are not comparable to other media. A typical theatrical film is currently produced in 2K (2048x1080 pixel image container), which means a master element of more than 1 TB and a distribution copy of approximately 200 GB size. Theatrical film is soon expected to adopt 4K (4096x2160 pixel image container) as the production standard, which will increase these figures dramatically.

9.1.2 Ambitions

The Community of Practice has as one of its core activities looked into best practice and standardisation with regard to the long term preservation of cinematographic film heritage in digital form. The file formats and attached metadata have to be both robust and well adopted within the community. Also, the storage and maintenance of these very large files has serious consequences in terms of cost and attention to the specific needs of the community. Although good quality analogue film is still considered the cheapest and most future proof storage media, the Community of Practice has also looked into standards and best practices in analogue to digital transfer.

The long term preservation of film heritage is typically stipulated by law. However, it is not dependant on financial return on investment, but rather on unique and intrinsic cultural and societal value. Preservation has to be as cost efficient as possible, while the risk of loss must be close to zero. While the OIAS model provides a framework and model of understanding, the actual implementation for cinematographic heritage needs a greater degree of specificity.

The CoP on film addressed some crucial issues in digital preservation, not the least through a webinar on Master Archive Package (MAP) creation.¹⁰⁸ MAP has the potential to be one of the best and most future proof film mastering formats. However, this requires that the format and profile is broadly accepted and adopted in the community, which is unfortunately not (yet) the case.

A workshop held in Copenhagen, September 2014, on digital storage and formats gave an opportunity to present findings from four Presto4U communities, as well as engage and discuss with members of the wider community, especially represented by film labs and video facility houses.¹⁰⁹

¹⁰⁵ DSM, Digital Source Master, the full resolution production element, in whichever format used, but typically DPX file format for feature film productions.

¹⁰⁶ DCDM, Digital Cinema Distribution Master, the digital equivalent to internegative, the master from which the DCPs are made.

¹⁰⁷ DCP, Digital Cinema Package, the digital film print, highly standardised JPEG2000 file format in MXF wrapper, can be encrypted or non-encrypted.

¹⁰⁸ <https://www.youtube.com/watch?v=5oMUhw-1GZM>

¹⁰⁹ <http://www.dfi.dk/FaktaOmFilm/European-Film-Gateway/Presto4U.aspx>

9.2 *The Community's long term digital preservation needs*

Needs for the film community were gathered and discussed at physical meetings with the core experts, as well as other members of the broader community. The meetings were held throughout the project period and a certain sense of digital maturity was observed during the project period. It is interesting to see that while the broader community believes that more research is needed, many of the core experts have implemented fully functional preservation repositories and digitisation workflows, thus establishing that the needs of the community, at least when it comes to immediate preservation planning, are more related to training, funding and information gathering rather than being strictly technical. In other words, the relevant technologies for data preservation are broadly speaking already available, while the capacity to adopt and implement is closely linked to sustainable funding and competent staff.

As might be expected, since digital is relatively recent in the film community, there is still a certain wait and see attitude in relation to both formats and hard- and software systems. Some of the most promising formats, such as JPEG2000, are unfortunately not as widely adopted as hoped, while others, such as Apple Prores, are very widely adopted, but have issues in regards to proprietary algorithms, thus making them inherently difficult to trust for long term preservation.

The project has offered an opportunity to bring together people from different groupings in the film sector and has been instrumental in making connections across institutions and people, which has allowed different input from what might otherwise have been shared. The connection with other related CoPs has been a real benefit in both finding similar challenges, but also in identifying specific differences, where digital film requires different approaches from other kinds of AV material.

The film community is in the middle of the digital transition and the project has offered a good opportunity to both provide resources and access to already existing knowledge in the fields of digital preservations and storage. It has therefore offered guidance and standard targets to institutions and staff in the process of implementing the relevant technologies. While the project may not have directly caused implementation of specific technologies and solutions, it has provided a certain degree of security and best practice to be followed by institutions moving from a predominantly analogue field to also addressing and using digital solutions.

9.3 *Barriers to the Community's adoption of new technology*

The film community is challenged in a number of ways, which can be traced back to the analogue histories of the community. Most of the film archives have in the last 30 years progressed from being simple warehouses of films collected for screening purposes, into being actual film preservation institutions. While most current films are digitally born, digital does not supplant the analogue heritage, but makes it an additional cost, which is difficult to get sustainable funding for.

It is essential for film archives to establish long term robust storage for unique digital elements. The film master format also needs to be robust and well documented, as well as unencrypted and preferable uncompressed or losslessly compressed. This makes for large files and consequently high demands for storage capacity and processing power. A medium sized European film archive receives 2-300 TB of unique data annually, which needs to be mirrored and stored on two different physical carrier formats in separate locations to ensure relevant redundancy.

Data storage itself is a tried technology and most large capacity facilities today use the LTO tape series (current generation is LTO-6) or Storagetek (T10K). The more complicated part is the CMS (content management system), which manages the location and retrieval of the specific files. To be OIAS compliant it is necessary to ensure implementation of checksums and future migration planning. Maintaining a storage repository is very different from handling a backup. Film archives have experience with long term passive storage, but digital preservation requires an ongoing systematic approach, with constant monitoring and migration cycles of 3-10 years, while analogue films in good condition can be stored for centuries under optimum climate conditions (5 degrees Celsius and 35% relative humidity).

File formats for digital cinema are relatively stable, but while JPEG2000 in the profile Master Archive Package (MAP) is a good contender as a “rosetta stone format”, it is not widely adopted, because it is not a very flexible format for production and access. Many therefore prefer to maintain the production formats DPX and Apple Prores, which are widely adopted and supported; more flexible, but also proprietary. A couple of new formats are on the horizon, IMF and ACES, but they are to some extent different flavors of already existing ones, which adds to the possibilities, but also the confusion.

In regards to digitisation, both for new production and for capture of historical analogue titles, much popular attention is given to the resolution (2K, 4K), but the field really needs some trustworthy specifications in regards to not just the image resolution, but also bit depth, capture devices and quality control. In general the digital film domain is still under establishment and there is strong and rapid development in many areas. While Hollywood has already adopted 4K as the standard, Europe is left behind in 2K, predominantly for budgetary reasons. While the transition from analogue to digital will maintain a hybrid environment for some time yet, the film domain is very much a field of craftsmanship, where the analogue competences risk not being carried forward as staff retires. There is a serious challenge in providing specifications, best practice and quality control standards.

For the film community many different digital solutions are being used in the production phase, while distribution is very standardised to allow films to be shown globally. Regarding preservation and storage, there is a growing concern that if content is not collected in conjunction with the initial production, it may never make it into a trusted preservation institution.

Film heritage institutions are quite willing to adopt digital solutions. However, the resources and organisational changes that need to be implemented to perform proper digital preservation are of a magnitude that many institutions struggle to find the financial and human backing. The digital preservation of motion picture films requires ongoing migration and a digital storage setup, which offers new opportunities, but also calls for added expertise, hardware and software at added cost.

To the film heritage institutions, digital has long been seen as a threat, since common thought, and real experience, has often meant that digital was seen as a replacement for analogue, thus meaning a zero sum “investment.” The reality is that both analogue preservation AND digital preservation should be funded and maintained. The main barriers have therefore been that institutions did not want to cannibalize already limited funding for analogue preservation, in order to implement expensive digital solutions, which might not be what they promised to be, thus endangering both the analogue and digital collections.

By providing clear guidance and identifying and establishing local centers of expertise, the risk of faulty investment can be minimised.

9.4 Connection between the Community and suppliers and vendors

There are a relatively limited number of suppliers for motion picture film technology. Direct contacts have been relatively few and based on experiences from the core expert group. Several core experts have had fruitful contacts with Fraunhofer IIS, which supplies the Easy DCP software suite, to which they have developed specific profiles and solutions for film preservation.

The main technology providers can be grouped in a number of categories:

- Content Management System (CMS) suppliers
- Scanner suppliers
- Laboratories and facility houses

CMS systems can be more or less integrated with database systems on one side and delivery and formatting solutions on the other side, which can make it difficult to pinpoint the precise border between the individual solution, and the added features and integration, which sometimes relies more on the integrator than the underlying technology. While the OAIS model¹¹⁰ functions as the overall guidance, the practical implementation and oversight is more reliant on actual management and work practice than technology as such. The Paris Preservation offered an opportunity to both meet technology providers, as well as talk to integrators of CMS/MAM systems.

Scanners exist in a variety of qualities and costs. Generally there is a correlation between cost and quality, so for preservation digitisation, the three to four scanners that make out the top of the market are the best and can produce 2K or 4K scans of motion picture film, which is superior to the lower end scanners or data-cines that are made for quicker access digitisation. Many of the choices related to scanning have to do with the connected workflows, and high preservation standards are costly not only in scanning equipment, but also in the subsequent needs for processing technology. Mikko Kuutti of the Finnish National Audiovisual Institute (KAVI) gave an excellent description of a high quality implementation of a preservation digitisation workflow at the workshop held in Copenhagen.¹¹¹

Laboratories and facility houses face serious challenges, since technology is becoming easier and cheaper to acquire by their regular customers. The business cases, where they used to have a monopoly on the technology needed to produce theatrical films, are rapidly deteriorating and they struggle to maintain an edge to provide quality service at lower price points. Much of the expertise in motion picture technology lies with this community group, but is in serious risk of being made obsolete by quick and cheap hardware and software. The real challenge will be to maintain objectively high quality in a marketplace that demands lower cost.

¹¹⁰ http://www.iso.org/iso/catalogue_detail.htm?csnumber=57284

¹¹¹ <http://www.dfi.dk/FaktaOmFilm/European-Film-Gateway/Presto4U.aspx>

9.5 Recommendations for the future of the Community

The film community, as far as preservation institutions is concerned, has a relatively well established network in FIAF¹¹² and ACE.¹¹³ However, even if institutions are somewhat homogeneous, they are nevertheless quite different in their internal structures and in funding. There is therefore a high degree of individual solutions and not (yet) a specific standard that fits all. The institutions organised in FIAF and ACE do have a framework for discussions and exchange of skills and knowledge, but there is a need for structured training and learning opportunities, beyond the bi-annual FIAF Summer School and ad hoc seminars and workshops. Most of the available courses and training is for entry level staff and senior university studies, while the training and skills acquisition for professional staff is difficult to address, not the least because the number of people working in film archiving is relatively small. In a sense, the community is well structured with good connections, but in practice it is difficult to lift the cross sector connections, because of limited network resources and opportunities. The project has offered an added opportunity to network and share knowledge beyond what would otherwise have taken place.

Digital storage and CMS solutions are maturing and the film community as a whole is in the process of implementing robust systems. However, just as the case with analogue storage, there is a risk that some institutions will not get the necessary funding to implement robust and trustworthy preservation, thus letting heritage be lost. As the Digital Agenda for European Film Heritage¹¹⁴ report pointed out, some years ago, the film heritage risks being caught in a double black hole; the fact that digital is urgent and funding is not being allocated with this urgency in mind, and that scanning technology may itself become obsolete, thus leaving the analogue holdings safe on the shelf, but irrelevant because they are not available in useful digital formats. The workshop held in Copenhagen focused on the film preservation situation and best practice solutions. More events, workshops and dissemination of information and best practice solutions are needed to increase awareness and share real working best practice examples.

The CoP for Film collated a number of best practice documents, which have been made available through the Presto4U library and resource section. It is very relevant to have this information gathered in a central, trustworthy and well organised online resource.

The project has been beneficial and relevant for the film community in helping align a digital transition, which has already been underway in a more global way for other fields within the AV sector. The project has employed some very good technology partners, but there is still need for concrete exchange and dissemination through workshops and seminars. The film community is still in the early days of adopting mature solutions, but even more exchange with relevant organisations, such as IASA, should be pursued.

Needed research

¹¹² FIAF, The International Federation of Film Archives, <http://www.fiafnet.org/>

¹¹³ ACE, The European Association of Cinematheques, <http://www.ace-film.eu/>

¹¹⁴ http://ec.europa.eu/archives/information_society/avpolicy/docs/library/studies/heritage/final_report_en.pdf

The film community needs research into the technical aspects of cinematographic film and the required specifications to ensure the best possible fidelity from the original elements. In a sense the film community is today, where the sound community was 20 or 30 years ago. If a sound engineer thinks a higher degree of resolution is needed, today it is just a matter of going from 48Hz to 96Hz. In the film community, 2K is often a very real limit in Europe, because processing power and practicality set limits that are restrictive and potentially compromise quality. Looking to the leading global film industry in the United States, there is already a “resolution gap” between Europe and the US, which currently looks as if it might expand rather than allow Europe to catch up.

9.5.1 Storage awareness and needs

There is a strong need in the film community to continue to emphasize the need for robust and long term preservation in both analogue and digital form of the moving image film heritage. There is a very real risk that the urgency of digital film preservation is not communicated. Also, the political level has to be informed that film heritage institutions cannot be expected to perform the preservation tasks on their existing budgets. The historical negligence in regards to film heritage, where many original negatives eventually made it to the national film archives, will for digital films mean more or less complete loss. The only way to ensure preservation of the film heritage is to take advantage of the cost efficiency of large volume storage and ensure the collection of new digital films through mandatory deposit and establishment of robust national repositories within the film archives.

It is worth mentioning that the most digitally mature organisations in the film heritage sector are the ones, which have received some sort of startup capital to establish digital facilities, either in scanning or preservation, or both. While the objective needs are relatively well described, the practical implementation is not currently an easy “one solution fits all.” Local solutions need to be established and tested, in order to get actual implementation and gain the necessary skills and insight at an institutional level. For example the balance between establishment of internal facilities and outsourced services is only one parameter, where local policy and practice might have different approaches in different member states and different institutions.

9.5.2 Future requirements

While the need for initial funding to set up and acquire the needed skills is important, the real need for commitment to long term funding and sustainability should not be underestimated.

The film community is very aware of the urgent and serious need to acquire digitally born films through compulsory deposit mechanisms; to scan the analogue heritage to provide access; and, to establish trusted digital repositories to ensure the survival of the digitised and digital film heritage. The European film heritage institutions hold the best position to implement cost efficient solutions, since they are best placed to collect and hold the largest volume of content. However, the financial models currently in place, where cost of preservation is retained by the archive and the profits remain with the creators, needs either to be changed, or to be underwritten by a political or funding commitment to ensure the long term sustainability of the historical film heritage.

While the European film producers should be supported to pursue the highest possible standards, it should not be forgotten that the film heritage institutions hold the best position to create cost efficient long term preservation for the past, present and future productions. However, while there are economies of scale involved in centralizing expertise and investment, it will not happen unless there is real and long term OIAS compliant commitment behind the solutions implemented.

10 Video Art, Art Museums and Galleries

10.1 *Introduction to the work done, general challenges and progress*

In 2012 a small survey was carried out by Patricia Falcao, a time-based media conservator at Tate, involving interviews with key staff from 12 organisations engaged in the conservation of artists' video (P. Falcao in 'Digital Video Preservation in Museums and Small Collections' American Institute for Conservation, Annual Meeting 2012, Electronic Media Group). This survey served to provide a baseline of the needs of the Video Art Community of Practice. Based on this survey the core expert group decided to chose as its focus for the work in 2014 the specific challenges presented by the move from digital video tape formats to digital files.

10.2 *The Community's long term digital preservation needs*

Those arts organisations who are engaged in the challenge of the move from tape to files have reported that this shift has been far more disruptive and difficult to respond to than first anticipated. For example, the majority of the expert partners who worked with collections had an established migration programme that was dependent on professional tape formats, for example Digital Betacam or D5. These digital tape formats were highly standardised with regards to the mechanics involved in playback, being dependent on very specific playback decks. However in the move to file based production, delivery, and storage there is far less standardisation related to how different combinations of software and hardware playback video files.

It has also been noted by a number of members of the community that it is very easy for artists to accidentally introduce errors during the production of files. Although the tools for video editing and production are very easily available, errors can easily arise when transcoding and rendering files. It is therefore important that tools are made available for artists and galleries to use when providing files to museums and collectors to support preservation from early on in the process.

In the first year report we identified five key areas of interest to this community:

1. Metadata schemas
2. Tools for the creation of AIP's such as Archivematica
3. Formats for preservation such as FFV1
4. Quality control
5. Scalable solutions

10.2.1 **Metadata**

Within the Core Expert Group we shared a list of core technical metadata that we felt we should capture for video files during the first year.

1. Accession Number and Component Number
2. Artist Name
3. Title
4. Year of the artwork
5. Number of channels of video in the work, and which channel this component represents.
6. Duration (e.g. 60:20:25frames)
7. Format (e.g. NTSC / PAL), Aspect Ratio

8. Codec (e.g. Uncompressed 10-bit 525 4:2:2 QT MOV)
9. If interlaced (if so also include field dominance) or progressively scanned
10. Timecode: (e.g. SMPTE 29.97 Non Drop Frame)
11. Audio Sample Rate: (e.g. 48kHz 24-bit PCM Audio)
12. Number of channels of audio and a description: e.g. Channel 1: Stereo Left, Channel 2: Stereo Right
13. Note if the video is Colour or Monochrome or Mixed
14. Ingested at [Location]
15. Date the component was created
16. Ingested by – name of operator/ conservator
17. Ingested from (e.g. Digital Betacam) + Accession No. + Component Number of the 'parent'.
18. Status indicator. This is a controlled set of terms that indicates the status and purpose of the file. For example ASM is the artist supplied master, whereas AM indicates the archival master which is held in a normalised format.
19. Representation information – so if a file is dependent on a particular player in order to be rendered correctly this information is recorded.
20. Information about the tools used to ingest
21. Checksum information

During the course of the second year we have been focussed on understanding better how to use tools for automatic extraction of metadata and also how to interrogate files in more detail, as well as finally focussing on what information to capture to support consistent playback in the future.

10.2.2 Tools for the creation of AIPs

Within the members of the Core Expert Group for Video Art, The Museum of Modern Art in New York (MoMA), Tate in the UK, and the San Francisco Museum of Modern Art have continued to explore the use of Archivemata with MoMA sponsoring a large project working closely with the Canadian company Artefactual to implement a system within MoMA. As Archivemata is open source this sponsored development work will benefit all of those working within a museum context to establish a digital repository for artworks. In April 2014 a meeting was held at MoMA at which five of the core expert group for video art were present. This meeting was held to present the ongoing work with Archivemata and Atom in the implementation of the digital repository known as the DRMC (digital repository for museum collections) for artworks at MoMA.

Within the core expert group for video art, Isabel Meyer from the Smithsonian has taken a different approach because of the institutional context in which they are working. The Smithsonian has a large digital repository for their collections which is built on DSPACE, they therefore have a good deal of the digital infrastructure in place for the management of digital video files. Their task has been to identify any specific needs that digital artworks might have so that they might be integrated into their larger repository.

10.2.3 Formats for preservation and standardisation

One of the most significant discussions to have been held within the video art community of practice relates to the question of whether or not to create a copy of the artist's supplied video file in a standardised format. Within the tape based world this was fairly common practice however the relevance of continuing this practice in the file based world were unclear.



Exhibit 18 Meeting hosted by MoMA in New York to discuss their work to implement Archivematica and Atom.

This formed the focus of a discussion hosted by the Core Expert Group for Video Art on the 30 July 2014 and the subsequent public webinar.

It has in the course of our work in this area become clear that there are a number of issues which impact this decision. The first is that those responsible for the conservation of video art have as their starting point a very wide range of formats and little or no control over what the artist supplies. Artists are often unaware of the impact of different decisions they make when creating files to send to the museum. In some cases they also may not be very interested or engaged in issues of technical quality. However, it is generally felt that there is less risk of file format obsolescence than there was in the case of tape formats. This in part is due to the fact that playing back a tape requires a specific deck to be manufactured and maintaining these decks once the format is no longer supported is extremely difficult. However, there is a suggestion that with open source tools such as FFMPEG and its libraries (libav) and techniques such as virtualisation and emulation file format obsolescence will be slower and less of a problem for the preservation community in the future.

However, where an artist has used a format which is not well supported or which creates problems with consistency when it is played back then the creation of a copy in a more standardised format and wrapper is requested.

In most cases those who are working with new works coming into the collection will discuss with the artist how a work was made and how it should be supplied to the museum. However, in some cases this is not possible. Some Core Expert Group members request a standardised copy of the video to be sent as part of their practice. However it is generally agreed to be an area which needs more work to establish clearer protocols.

The discussion about standardised file formats raised questions about problems associated with the consistent playback of files. It was recognised by the Core Expert Group that this was an area where it was important that this community increase their

understanding so as to develop effective procedures, policies and workflows. The Core Expert Group therefore commissioned a report from Dave Rice on this topic.

10.2.4 Quality assessment



Exhibit 19 QCTools workshop led by Dave Rice, hosted by the Presto4U Video Art Community of practice at Tate Britain 29 July 2014

The video art community is very interested in quality assessment to ensure that files produced by the artist for the museum or collector have been made in a way that makes sense given the production route of those files and that no unintended technical errors have crept in and that any processing done after a set of files has been acquired does not introduce errors. Where the artist is not available or the information about the production process of the video is not forthcoming, quality assessment processes may also give clues as to the production process. This tool set is also providing a means, for those concerned with preservation, to examine problems in contradictory metadata in files which may create problems with consistent playback. The BAVC QCTool set has recently been developed and is likely to be widely adopted by this community. This open source tool set is providing tools for conservators to analyse their video files in ways which were not so easily accessible in the past.

To increase the knowledge of these tools the Video Art Community of Practice hosted a free one day training at Tate Britain on the 29 July 2014 led by Dave Rice.

10.2.5 Scalable solutions

From the outset the Video Art CoP Core Expert Group was concerned to establish workflows that could be scaled to the single artist or small collector and also which could be offered as a service by a facilities house such as VET in London. It had been hoped that within the life of the project we would have been able to host an artists event at Tate to discuss these issues, and whilst we remain committed to this idea it is clear that some issues remain to be resolved. The parallel project Matters in Media Art is also looking to provide information to artists and it may therefore be possible to host a joint event

when they publish information on this in the Spring (<http://www.tate.org.uk/about/projects/matters-media-art>).

10.2.6 The conservation of contemporary artworks

Unsurprisingly, for artists any problems with a lack of consistency in playback can be a significant issue. It is part of standard practice for the conservation of contemporary art, to work closely with the artist to understand what is important to preserve about a particular artwork whenever possible. For a complex installation this may involve far reaching dialogue related to details about how the visitor enters the space, the acoustics, the light levels as well as details about the qualities of the video image and the sound. Attitudes towards technological change are complex. Some artists may want to fix the qualities of an image at a particular time, others may want to preserve the sense of an image being of the moment. Often we do not see the qualities and artefacts of an image until the technology is no longer current and we have become accustomed to a different type of image. Played alongside each other, video created and played back using technology from 1994 compared to video created and played back using technology for 2014 will look very different. This is in part due to the difference in the hardware technology used to capture and playback the video and partly due to the changes in projector or screen specifications.

However whatever the pressures of change, and however the artist and museum decides to respond to shifting technologies and the challenges of obsolescence, not being able to fully understand and control the consistent playback of video files with contemporary technology makes an already challenging environment even more so.

10.2.7 Standards and workflows

The workflows involved in managing video as files compared to tape are very different. This shift has meant that there has been a convergence between the library and archive community and the models that have been developed around their context and the contemporary art conservation community.

One of the most interesting realisations to emerge during the past year of the Presto4U project has been a greater understanding of the differences between an archive context and a contemporary art museum context. In a traditional archive, preservation is conceived of as an 'end of life' activity for objects entering the archive. In a contemporary art museum, works of art are considered to be still evolving and engaged in their active life whilst at the same time being the subject of conservation or preservation efforts. This has led to some interest in Continuum Theory which has been developed by the records management community in Australia. This theory also seeks to articulate preservation during active life. This theory in some ways challenges the OAIS model which many in the museum community have felt fails to mirror the rhythm of the lives of digital objects within the museum.

The fact that video artworks are subject to preservation efforts during their natural life has implications regarding how key elements of a digital repository, such as the Archival Information Package (AIP), is conceived. Within the Video Art Community of Practice, two different approaches are being tested. In one case the multiple components, including different versions of the media components of a digital video artwork, are all designated as individual archival information packages. In this case the challenge then becomes how to record relationships and dependencies between these different components. In the other case all the components become one AIP and when that AIP changes, perhaps new

exhibition copies are created and kept because they are of value as a reflection of the history of the work, a new AIP is made and the previous one destroyed. There is also a middle ground, where on acquisition a Submission Information Package (SIP) is created reflecting everything that was supplied on the acquisition of the work, and this is stored in the repository as an individual AIP and then this is broken down into distinct AIPs reflecting the component structure which is recorded on the collection management system.

To progress our work in this area a working group worked with a recent graduate MA student from the digital asset management course at Kings College London. One of the things that became apparent was how little documentation existed regarding the way in which the OAIS model and in particular how AIPs are defined in different use cases.

10.2.8 Tools and technologies

During the life of the project there has been great progress regarding appropriate tools for those engaged in the preservation of video art, in particular with regard to the use of open source software.

In most cases the adoption of open source software is not because individual organisations are interested in carrying out any coding themselves, but rather there is an interest among this community in collaborating to support the development of tools that are used by this small user group. There is also an interest in sharing knowledge so that we can together support the development of emerging practice. In most cases the video art user community is one set of users among many. Take for example MediaInfo, this is a tool which is used broadly across all communities engaged in the preservation of video.

The conservation department of the Museum of Modern Art in New York, is an excellent use case in this regard. MoMA has sponsored Artefactual systems to carry out a sizeable amount of development regarding Archivematica and ATOM and also the interface between Archivematica and other systems such as the collection management system designed by Gallery Systems, TMS, and storage solutions such as that offered by Arkivum with which Archivematica is required to interface. The results of these sponsored development efforts will be released as open source software to other users.

Another tool which is of great interest to this community is the quality assessment tool, QCTools developed by the Bay Area Video Coalition. This tool has been designed to enable those engaged with the preservation of digital video to really be able to interrogate the video file and understand better its history and its vulnerabilities.

Many of these tools are built to rely on FFMPEG. FFMPEG and QCTools was the subject of two day-long workshops held at Tate Britain in July 2014 which provided free training to members of the community. This training built on the meeting in year one where members of the Video Art Community of Practice attended a meeting hosted by Tate of those interested in creating a European user group for Archivematica.

Despite the development of new tools, the level of investment in infrastructure needed to process and store video files is proving challenging. This move to file based video has meant that those responsible for preservation are needed to work more closely with those responsible for information systems and technologies than was recently the case. Persuading the senior management within museums to invest in new systems for the preservation of video is challenging in these financially constrained times.

10.3 Barriers to the Community's adoption of new technology

One of the most significant barriers to the take up of tools by this community has been the disconnect between the way in which those working with collections of video art approach the development of requirements and the formal language of functional and non-functional requirements.

To support developing better communication between software developers and the video art user community Walter Allasia from Eurix provided training on Prince 2 Project Management and also UML on the 28 February 2014. This training was attended by 15 people and was extremely valuable in demystifying some of the language and tools used by software developers in developing and implementing new tools and systems.

It is also the case that research is needed within the community to develop and articulate their requirements more fully as practice develops that addresses the needs of file based video art. Developing appropriate workflows and policies is not a trivial matter and is widely seen as a challenge best addressed collaboratively.

Many of those responsible for the preservation of video art collections are also often responsible for the preservation of other types of objects within their collections. There may therefore not be the expertise in house to implement and effectively integrate new tools and solutions within their workflows.

Most cultural institutions are extremely restricted regarding available budgets for specialist systems and software. Solutions that support varying degrees of infrastructure, skills, integration and automation therefore suit this community, as do open source solutions with a large degree of community support.

This community recommended two tools for assessment within the project, Archivematica and the Bay Area Video Coalition's quality control assessment tool (QCTools). In both cases there has been a significant amount of community involvement in the development of these tools. In both cases, as needs have emerged, it has been possible to engage in dialogue with those directly involved in the development of these tools. For this reason a tool not fully fulfilling a set of functional or non-functional requirements is not seen as a barrier. Instead the dialogue and sense of community engagement is seen as more important regarding the ability of tools to grow and adapt to changing needs and a growing understanding of those needs.

Within the community responsible for the preservation of video art the visibility of what colleagues are doing in peer institutions has a powerful influence. Raising the profile of these tools and their adoption within the community has therefore been an important part of the Presto4U contribution.

10.4 Connection between the Community and suppliers and vendors

One of the ambitions of this Community of Practice has been to open dialogue with a facilities house to explore ways in which solutions identified within this community might be supported commercially. This has been identified as beneficial not only in enabling access to solutions by individual artists but also to support the work in larger institutions. To this end the Video Art CoP Core Expert Group has included both Joan Lease of VET in London and Agathe Jarczyk of the Video Restoration Studio in Switzerland. Both of these individuals are seen as an integral part of this community of practice with the added benefit

that both are engaged in training as well as the provision of services. The hope is that they might be able to act as a model that could be adopted by a broader number of service providers.

A new contact also made for some of the members of the Core Expert Group within the context of this project was with Dave Rice, who has been working on the QCTools software and Jérôme Martinez who is responsible for MediaInfo. Both are software developers who work within the context of open source software, Dave Rice is also an expert on video technology and a trainer. The contact with Dave Rice is extremely important in providing technical support to those engaged in addressing some of the outstanding challenges which are preventing this community from establishing effective workflows.

Few vendors really spend the time to engage in the specificity of the museum environment and the specific requirements associated with the contemporary art museum context, not least because this is a small community and therefore a small potential market. In the course of the Presto4U project this community has begun to appreciate the degree to which technological problems represent only a small part of the wider issues and how the development of policy and practice is in fact a more significant challenge, but also what an enormous impact the arrival of some tools aimed at this community has had on the potential to preserve these important collections. The Presto4U project has however provided important opportunities to discuss the issues of this community with vendors and software developers such as Joanneum Research and Eurix as well as service providers such as Moving Media Ltd. The project has also helped us to identify common issues and challenges that we share with different communities. This has been important in helping to identify where solutions that might be driven by those other communities might benefit those engaged in the preservation of video art.

10.5 Recommendations for the future of the Community

It is widely recognised that until we can describe workflows that are deemed by the community to adequately cover the handling of video files from the point when a video artwork is acquired to its storage within a digital repository and subsequent management within the active life of that work it will be difficult for the community to take up research outputs and technologies more broadly. These workflows are in active development and the Presto4U project has supported and facilitated important dialogue that has not only identified areas of consensus but also highlighted where the significant questions and challenges still lie.

It is clear that the establishment of functional and non-functional requirements of this community is itself in need of research and would benefit from a more iterative dialogue by members of the community with a range of technologists.

It is also of key importance that the problem of consistent playback is studied so that appropriate workflows and practice can be established to preserve the significant qualities of artist's video. It is in this area that we see the preservation of video files as being similar to the preservation of software-based art; with a parallel need to understand the dependencies of the behaviour of the video file during playback on other parts of the system, whether hardware or software. To this end the community commissioned a report from Dave Rice to help continuing work in this area.

This Core Expert Group has focussed largely on works which are destined for a museum or are already in a collection. We were conscious that in most cases the situations we focussed on were the more luxurious scenarios and there still exist collections of video artworks which are in a very poor state of conservation with little documentation. Internationally there are collections which are at risk of being lost from the history of art.

In addition to recognising that establishing workflows and practices for file based video artworks is still an ongoing process, many of the Core Expert Group are also interested in discussing processes and preservation policies related to other types of time-based media artworks. For example, the preservation of artists' film installations was an area where many in the Core Expert Group would like to share information on current or emerging practice.

10.5.1 Continuation of the core expert group

The members of the Core Expert Group valued the opportunity to be part of current discussions with institutions both in Europe and the United States and to share information and experiences with others with common goals and interests. Those engaged in the preservation of video art are a small highly engaged community and are naturally collaborative. Hence every effort will be made to continue the work started within Presto4U within the context of other projects and forums. The Presto4U project has helped to strengthen some relationships and also develop new relationships and networks. It has been very helpful for the video art community to see itself within the context of other user communities. The Presto4U project has also encouraged this community to use different tools such as webinars.

The PrestoCentre is valued by this community as an information portal and also for its meetings and conferences. It has also provided valuable contacts between suppliers and different communities and different forms of expertise. The legacy of this project will be strongly felt in how this community develops and in future projects undertaken over the next five to ten years.

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