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D6.2: Longitudinal CoP Impact Analysis: Simple longitudinal study of the potential impact of the CoP Activities based on the CoP reports and their progress over time

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Scope

The scope of this Deliverable is to study the impact of the Presto4U project on the CoP activities, based on CoP reports and their progress over time. The study will include a validation of the models from WP4T1 based on real uptake case studies, the influence of technology watch and brokering services on CoP's choices, and a satisfaction survey for every CoP on the role of the project for the understanding and adoption of new solutions.

A brief introduction presents the economic environment in which the various communities face the challenges of preservation and how these are addressed with different approaches depending on the type of community.

The second part, presents the analysis of the interactions within content holders and producers, service and technology providers. It will also gain input in the ability of the Communities to internally integrate technology or a specific practice in terms of specialized and skilled staff, internally available technology or potential financial resources and their dependence from external technology, financing and service providers.

The third part intends to draw some conclusions on the project status, through an analysis of the expectations and achievements from the point of view of all the nine communities involved in Presto4U. A satisfaction survey, in the guise of a common questionnaire, has been submitted to all the CoP leaders.

1 Final overview on the status of the Communities

The Presto4U project was conceived to promote and develop tools and actions in order to increase at the largest possible scale the uptake of preservation initiatives, mostly among those audio-visual communities where this action has been slow or not done. The structuring of the Presto4U project in different Communities of Practice, each with different profiles and needs, has permitted to gain a clearer perspective about where each of them is on the road to preservation and what are their needs, on the short and on the long term.

From the conclusions we drew in D6.1, it came out that economic issue is an obstacle to digital preservation for all communities. Archiving and audio-visual content exploitation, beyond his historical and cultural role, may generate revenue, but at low speed and in a long-tail perspective. That's why it is always stressed that the best attitude is to have a clear understanding of the implicit costs of digital preservation and to analyze the costs and benefits of any action.

Digitizing and preserving are not quickly done actions; they take time to organize, to secure the appropriate funding, to assure the legal environment, to train and prepare staff and to decide the functioning and use of the archive or collection once they are digital. The advantage of the digital world is to provide a new environment for publication, distribution and exploitation and thus to bring a totally new value perspective.

Problems are different and often linked in such a way as preventing actions to be undertaken. Issues such migration strategies, metadata organization, selection of most appropriate formats and standards are some of the most common and they are facing up each time preservation is addressed. Awareness is however progressing and Presto4U has strongly contributed to this through understanding and fostering problems and solutions.

There still is the fundamental problem that Communities of Practice are in a heterogeneous situation regarding the approach to these general considerations. The legal environments in which they are confined to, as well as the existence of an archival mission, have strong consequences on the undertaken actions.

In fact, there is a deep difference between communities that have sufficient funds to implement reliable strategies for preservation and the others that, due to lack of support, organization or awareness, are forced to "survive".

Professional stakeholders fall under the first category and they are respectively: Broadcast, Video production and postproduction, Film collections and filmmakers and Footage sales libraries CoPs. These Professional actors groups are representing together the whole world of video production for commercial purposes, included film collections, with or without a commercial perspective. Despite this variety of players, all the professionals involved in this community share common problems such as necessity of digitization, effective storage solutions, delivery and preservation format choices and so on.

The five remaining communities, having a more "cultural" mission, are not necessarily involved in business activities and they struggle, some more than others, with major funding problems. Sound & Music archives and Art & Museum objects CoPs share common concerns with the diversity and complexity of the (physical, analogue or digital) objects they conserve and are strongly concerned with the re-performance, re-production or re-presentation of the works they collect.

The Research and scientific collections share common problems with Learning and teaching repositories, where specific issues arise concerning the reuse of contents. A unique case is represented by Personal Contributions: unlike many professional organizations, people at home typically do not have special services or knowledge on how to keep their digital data from loss or corruption. Individuals and families often don't have enough skills to develop an archiving project and without education and training most of them are in the position of simply doing the best they can. The appearance of services in this domain would really help to address this particular problem.

2 Digital preservation research and development

Through the development of the Presto4U project, we gathered information regarding the shape and scale of technical challenges faced by the audio-visual archiving communities. In parallel, we have conducted a deep search into the technology supply side to gather information on products in the market today, products not on the shelf resulting from research projects, and to see where research is heading and to hopefully solve the challenges that continue to exist.

PrestoCentre wanted to be a strategic partner connecting the preservation challenges and needs of audio-visual archives to the solutions available from industry and research, guiding audio-visual media owners through change and helping them shape up for the future. We also aimed at helping vendors in the audiovisual domain by assessing the impact of solutions on archives at different stages of development, by analyzing relevant standardization activities, and identifying areas for new work in research and innovation.

2.1 Report on the take-up of research outputs by end-user communities and their supply side

There are many barriers preventing the adoption of research results in our Communities of Practice. Some of them are listed in the following:

- Lack of identification (difficult or even impossible to search and find the result)
- Missing portability
- Legal and licensing constraints, such as policies, copyrights, patents
- Integration and standards compliance, that implies broken interoperability and lack of interfaces (usually the matter of standardization)
- Lack of implementation, especially in research contexts - prototypes are wrongly considered to be final results, when they are missing several necessary functionalities
- Complexity, because as can be easily guessed research aims at finding fast solutions, ready to prove analysis and theories, leaving aside scalability, good user interfaces, friendly use, documentation and manuals: that introduce huge complexity in their adoption

In the industrial domain, where research and development are strongly linked because the objective is to bring out new products, the passage between the invention and the adoption of a new solution works better, because the survival of the company highly depends on research results and research is thus considered from an application point of view. In large institutions or purely research groups, the outcomes are less evident and more difficult to be translated to products or services. The company may not have the structure in terms of development, spin-off potential or simply complex administrative decision-making. The effectiveness of developments and industrial take-up, highly depend on fast decision-making and in fast development periods of time as well as with necessary funding to develop an industrial product.

Regarding research results, there has been a strong evolution in the last years: research results (mainly algorithms) tend to be integrated in black boxes doing specific tasks in the audio-visual domain. This was very common in the AV restoration domain where plug-ins

were developed doing specific tasks within a general (and often commercial) framework. When there is an existing framework, it is much easier to integrate results and sometimes there is only a small amount of developments required. Today most results are web based, which dramatically simplifies their interfaces and the related access to information.

2.2 Influence of technology watch and brokering services on CoP's choices

During the past decade, much debate has been entered regarding into the choice of tape or disk solutions for long-term storage of file based audiovisual assets. The debate began with cost comparison, but as disk price decreased this became less of an issue. However the primary reason for choosing disk remains around speed of access, which, for most archives excluding 'production' archives, is not an issue. The raw cost of LTO versus disk does not consider the cost of the software and services required in using data-tape, and this has been an issue for many users in recent years. Also data-tape systems tend to be more reliable through time and less subject to errors. The proprietary nature of how software applications such as Media Asset Management systems (MAMs) transfer information to tape meant that users were tied to the Independent Software Vendor (ISV) who supplied the MAM and other software systems that interfaced with the storage device, thus creating a whole new set of difficulties for archives. This resulted in additional costs and reliance on the event of the system (or vendor) failing, or when it was time to upgrade the application stack, to condense the archive, as newer higher capacity tape generations were released.

In order to provide to the audiovisual archives some open source tools for managing Linear Tape Systems, the previous PrestoPRIME project has developed the *LTFSArchiver* software¹. The goal of the software is to effectively manage the storage of generic files and it is optimized for working with large (several GB) multimedia files. In our evaluation, *LTFSArchiver* has reached good scoring in nearly all the considered characteristics. Its principal point of strength is its simplicity of use and maintainability, its good interoperability via use of the LTFS standard and low consumption of resources. *LTFSArchiver* has been developed with the support and input of a team at one of our member organizations, the RAI Technology Centre in Torino in Italy, who will be using the system in an upcoming digitization project of a very large collection of BetaCam Video tapes where the resulting files will be stored using the *LTFSArchiver* software.

So data tape (perhaps now more than ever, with the addition of LTFS) offers a value proposition that is very relevant to the AV Archiving sector through low cost and high bandwidth access, but not necessarily random access.

The move to the 'cloud' on the other hand has provided many storage services in the past year, but the general feeling among vendors and archive data users is that the term 'cloud' is too broad and can mean a wide range of things depending on the application. Consumer cloud products are not really relevant for long-term data storage — they are closer to on-demand computational horsepower for running web applications and storage facilities.

Lossless compression of audio-visual for videos is a very relevant technology for long-term preservation, providing storage savings over uncompressed storage while still being able to reconstruct bitwise identical data. *JPEG2000* lossless is one of the most common

¹ For more detailed information about the *LTFSArchiver* and its implementation, please see D6.3

lossless compression technologies for video data, but has a rather high computational complexity, especially for the encoding.

Recently, alternatives have emerged having lower computational complexity with compression rates comparable to *JPEG2000* lossless. One of them is *FFV1*, which has been created as part of the *FFmpeg* open source project. It has already been successfully used in some preservation projects. A similar technology is the *TICO* codec from *intoPIX*, which can be scaled from lossless to visually lossless, having low computational complexity and decoding latency. While all these emerging codecs have very interesting features, one should not forget that there is a risk over well-documented formal standards (such as *JPEG2000*), which is the lack or incompleteness of information and the diversity of versions. As paradoxical as it may seem, this even holds for open source software. As long as an active developer community is around, it is easy to add support for new features and to support new platforms, but working on someone else's sparsely documented code can take significant time just to make a small fix.

Media Asset Management (MAM) is an on-going challenge for archives. The process of digital migration is bringing some of the underlying challenges to light. There seems to be plenty of technology providers who have some or all of the necessary bricks, but it appears that whilst some MAM providers include archive support in their thinking, not all of them realize (or care) that their technology is also useful for archives and for archiving.

The intention here is to look at the key issues that have to be addressed in the process of storing, maintaining and successfully retrieving files. First of all the needed storage space. It doesn't seem to be a problem the space for all the data anymore, even though many people will quote storage as an issue (consider the amount of space needed to store a 2-hour, native format 4k movie, which is several terabytes). What is of more crucial here is the reliability of the storage, the accessibility of the content, the metadata handling, the transfer speed and the search and retrieval capability.

Metadata is absolutely crucial. There are plenty of vendors who are interested in finding ways for annotating ingested data files, mostly through some kind of ingest workflow solution they offer. The choice is between an open standard (such as MXF) and a closed proprietary solution. The advantage of a complete package is that installation and support is simple; the disadvantage being that they are 'locked into' a single vendor solution, and export of metadata is difficult other than to other systems using the same schema. Many MAM suppliers are offering MXF based workflow solutions, which have the advantage of conforming to widely accepted standards and allowing migration or interfacing with other storage systems. Since these workflows often incorporate quality assurance and content analysis components it is beneficial to use metadata schemas that conform to open standards, so to provide both compatibility between systems and longevity.

2.3 WP4 Case studies: Adoption of Research Outcomes during the project

2.3.1 Cube-Tec (Jörg Houpert, Cube-Tec & Christoph Bauer, ORF)

Both ORF and Cube-Tec have a long history of collaboration through a range of different projects and industry associations, both are participants in the European Research project DAVID funded under the FP7 program, which began in 2013. The DAVID project addresses the challenge of how to keep audiovisual content usable over time and was set up with a strong focus on looking at damage to media, detecting its source, defining errors

and looking at how these problems can be detected and avoided in audiovisual preservation workflows. The project was also set up to create ways to minimize and fix errors when they were detected; in order to support this the project partners represent a good balance between technology developers and research centers in the audiovisual archiving domain as well as practitioners such as INA and ORF with whom they could fine tune requirements and access real damaged media and workflow problems.

The initial expectation of the research and technical teams working on the project was that the main issues the found concerned issues like Bit Rot in data repositories. However after some independent interviews were conducted with a panel of expert archive users (organized by ORF) the results pointed out a different set of issues related to the core project objective of keeping media useful over time. The issues centered on problems to do with system generation interoperability and compatibility between formats. The archives were most concerned about workflows and the complexity of introducing new technology to upgrade certain components within a technology stack such as the storage hardware or the media asset management software system. In many cases media file and metadata formats being used by a previous generation of a system component were not transferring well to a new technology environment.

ORF had a very specific problem in this regard which came to light after an upgrade of storage technology at the Broadcaster, which did not accept the format of video files that ORF had on their existing storage. Previously ORF had digitized 23,000 hours of content for its sports department, the D10 video files that were created at the time of the digitization project used MXF as the media file wrapper (that is the file that contains or 'wraps' both the PCM audio and D10 video elements or streams together in a single file package). When ORF began to migrate this collection of audiovisual video files they found that some of the files would not transfer, first a few hundred, then thousands until they learned to their great disappointment that as much as 50% of the files would not transfer to the new system. Whatever error was causing this problem it was hard to find and had not been detected running the quality control tools that were available at the time the digitization project was undertaken and they realized that external help may be available to them through their connections in the DAVID² project.

Clearly the scale and complexity of this problem was both an opportunity and a challenge for the David project partners, a decision was made with the support of the EU FP7 liaison team to set up a work plan within DAVID to analyze the problem and investigate possible solutions that would be of value to the wider community in the future.

The first step in this analysis phase was to collect a group of samples and detect where the issue was coming from, the second step was to propose a solution that would maintain the integrity of the audiovisual essence. This was a most important aspect of the solution as transcoding the media stream would not have been an appropriate tactic as this could have introduced degeneration in audiovisual signal quality. These files had to be repaired without touching the media essence. After a period of analysis the DAVID partners detected the issue in the files that ORF had encoded and proposed a means to repair the files without re-encoding or modifying the bit stream of the essence. They figured out that by aligning the content of the file and repairing the container to create a standards compliant MXF file the files could be migrated to the new system and would remain interoperable with future systems.

For ORF this was a very positive result, the fact that they were participants in the DAVID project had enabled them to work on solving the problem without having to risk investing in a research project with no guarantee of a positive outcome. For Cube-Tec it became clear

² <http://david-preservation.eu/news/>

that there was an emerging opportunity to bring this research forward to market as a product if significant interest existed outside of the test case. After some market research they found that the technology could be positioned as an 'MXF Legalizer' a tool for checking the validity of MXF files and repairing them to meet industry standards. Both ORF and Cube-Tec agreed to invest in a project to develop the tool thus solving the problem for ORF and providing Cube-Tec with a strong use case and beta development project.

Within a few weeks they had a plan and also a problem, the files could not be sent to Germany for processing as ORF, like many archives, are not in a position to allow their master media assets to leave their control and as each file was approximately 45GB's in size it was not economical or technically feasible to do so in a short period of time. In order to proceed, the solution had to be architected in such a way that it could be deployed in ORF's data center, the location in which the files were stored.

In order to test how this could work Cube-Tec designed a two stage plan, the first was to allow both companies to agree how the MXF Legalizer application would work and the second was to deploy the application in the ORF data center in such a way that Cube-Tec could configure, monitor and manage its performance, effectively providing the application as a managed service. In the early stages Cube-Tec provided an online service that allowed ORF to drop sample files onto a web server, their application would sweep to detect files and where new files were present it would process these files and drop the repaired file back into a delivery folder which ORF would then check. This process of providing a web based method of sampling the MXF Legalizer has been maintained by Cube-Tec and has become a key part of their commercial strategy in how they promote and sell the technology. It provides a very straightforward means for any potential user to see quickly the results of the system without any need for system integration or the installation of software on the user side. It allowed to test the system and workflow externally without having to deploy internal resources to technical configuration before knowing the solution met with their needs.

Once the functional requirements of the system had been tested the project moved to its second phase where Cube-Tec installed a server in ORF's data center in order to provide the service. The integration, modeled on the web based service, was very straight forward; Cube-Tec set up a target folder on ORF's network into which problem files could be placed, once processed the repaired files were put into another folder on the ORF network that was monitored by the Media Asset Management system. On detecting the appearance of a new file in the MAM input folder the MAM system was configured to ingest the file as normal.

The service model that has been developed in this case is notable, as many products of this type have previously been sold as software products under license. There are advantages to both parties in this service model, ORF can use the system to repair the specific files for this project and choose to dial back the usage once the project is over, Cube-Tec are also in a good position as they will not have the upgrade or support issues that come with servicing the needs of a distributed base of installed applications.

The MXF Legalizer project at ORF was the first time a repair of files had been made without having to touch the media file itself, this was a fantastic outcome as for ORF as the prospect of having to go back to re-digitize the original tape would have been a very expensive route to take. The collaboration facilitated through the support of the FP7 Project DAVID and the trust built between the parties through that project enabled Cube-Tec to develop a solution and bring the research to the wider marketplace faster and with significantly less risk. The commercial model that has emerged may influence future

commercial strategies for the productization of research in this sector, providing easy access to a cloud based trial enabling prospective customers to self-test technology with a light overhead is a strong model and one that could also be applied to research demonstrators.

2.3.2 VidiCert (Christoph Bauer, ORF and Peter Schallauer, JRS)

During 2008 and 2009 ORF embarked on a significant project to digitize 300,000 hours of video tape recordings from their archive. These tapes were primarily Digital BETACAM and IMX format. ORF knew that the human resource overhead to check the digitized files generated through such a large migration project would be extremely high. Their experience had also taught them that while a manual quality assurance process undertaken during the digitization phase can detect big errors, small errors typically slipped through. ORF wanted a system that could ‘see’ and ‘hear’ the ingest process and to notify a skilled technician of a possible flaw.

ORF had worked with JRS on several European Framework projects, the main one being the Presto series and were familiar with the work that JRS had been doing in the area of automated image and audio quality checking and their development of film restoration tools.

VidiCert is one result of 20 years of research into baseband video analysis and restoration that has been undertaken by JRS through a series of both national and collaborative EU projects, which began in the mid 1990’s. While first projects concentrated on digital video and film restoration, in the early 2000’s JRS recognized that media workflows would soon become tapeless and that in this new file based world quality control and assurance tools for video and audio would become a new and growing area of requirements.

In 2008 JRS began work on a national project in Austria called vdQA, this project focused on the development of basic technology required to perform automated quality control and checking. The first specific detector that was developed in this project was designed for the detection of various analogue synchronization issues.

The outputs of the vdQA project were further developed and enhanced during the PrestoPRIME project where JRS continued to develop the range of detectors in the core system and began work on a graphical user interface. It was at this time that ORF and JRS began to collaborate through the platform of the FP7 PrestoPRIME project. Both companies continued to collaborate in the DAVID project, which now sought to apply the fundamental research, and to expand the scope of the detector sets to include Digital BETACAM formats in line with the specific needs of ORF and other European Broadcasters. The performance was evaluated on a number of different metrics including precision and recall on a defect sample set for a number of the error types that ORF were seeking to detect. It was found during this testing period that in many cases it was not possible to fully automate but rather to flag issues to a skilled technical operator who could validate the system output very efficiently. In DAVID JRS was also able to develop richly featured early stage application demonstrators for automation of baseband video quality control.

In the course of the different national and EU projects sample data have been collected from ORF and other end user institutions involved in these projects. Providing a data set is of utmost importance to a project of this type and often involves considerable effort to compile. Collection of test data typically does not happen during a business’s normal commercial operations but may happen with the support of a research project and can in such a case benefit a much wider community.

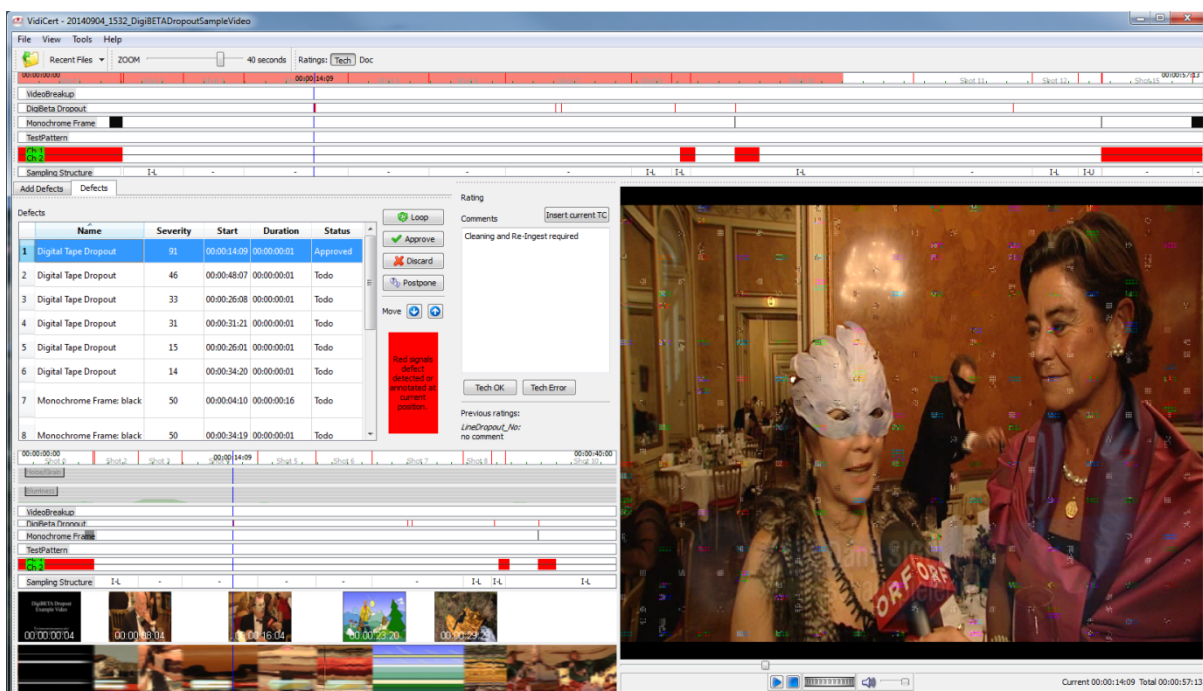
As the basic technology system was in place due to the previous projects and the maturity of the detectors and demonstrators already created this allowed JRS and ORF to engage on a much more specific application led project and to get the buy-in of the stakeholders as there was tangible results that could be shaped towards a specific solution.

In 2012 ORF began the process of outsourcing the migration of the 300,000 hours of Digital BETACAM and IMX tapes and in parallel began to collaborate with JRS to develop a baseband QC solution fulfilling the concrete needs of the ORF migration project.

From JRS's perspective they had to assess the crucial stage between a prototype system and a product. This is an area where they have significant experience, having previously invested in the productization of research outputs for mass use. They began with a business case analysis, looking at the potential routes to and size of the market, then they decided that there was a wider market need that would support a return on investment in development.

As the core functionality had been developed in the preceding research projects it required additional investment to create a specific solution. Both ORF and JRS decided to invest in the initial prototyping stage, allowing ORF to rigorously test the functionality and provide direction in terms of the development of the application. The good relationship shared by the representatives of the two companies through their previous work together facilitated a strong collaboration with an ease of communication. This ease of communication can lead to a better understanding of needs and this in turn can find its way into the manual for the application that is developed making the system easier to use for future users.

In 2014 the use of VidiCert has moved beyond the feasibility study stage and into a pilot phase at ORF, and ORF and JRS have developed a commercial relationship.



Peter Schallauer from JRS explains: *‘VidiCert detects specific tape digitization and migration defects (e.g. analogue tape errors or Digital BETACAM tape dropouts) and allows with its new defect summarization and efficient interactive verification techniques, an optimized utilization of operator time for baseband/essence QC. This improves the QC efficiency in video digitization and digital migration projects as well as allows the search for*

content within a digital archive by video essence/baseband quality criteria like blurriness or level of noise.'

Two key success factors in this project were the quality of the test data set and the clear understanding of user requirements that allowed JRS to deliver an application that met the needs of a wider group of users in a highly targeted manner. Both were facilitated through the iterative projects that led to the collaboration between ORF and JRS and the relationship between these two organizations was supported and fostered through the more recent EU funded projects. Where initial research investment targets work to define and understand fundamental problems subsequent investment can be used to develop prototypes that demonstrate solutions, this both de-risks and catalyzes private investment in the final productization stage as demonstrated in the development of VidiCert.

2.3.3 Archivematica (Kate Lewis, Ben Fino-Radin and Peter Oleksik, MoMA)

The Museum of Modern Art is an art museum located in Midtown Manhattan in New York City between Fifth and Sixth Avenues. The Museum of Modern Art's collection has grown to include over 150,000 paintings, sculptures, drawings, prints, photographs, architectural models and drawings, and design objects. MoMA also owns approximately 22,000 films and four million film stills, their Library and Archives hold over 300,000 books, artist books, and periodicals, and extensive individual files on more than 70,000 artists.

Archivematica is free open-source digital preservation software specifically designed to maintain standards-based, long-term access to collections of digital objects. The open source software project is managed by Artefactual Systems.

In 2005 MoMA's Chief Conservator, Jim Coddington, engaged the organization in one of the first collaborative projects between the New Art Trust, and its partner museums: the Museum of Modern Art, the San Francisco Museum of Modern Art, and Tate. This collaborative project called 'Matters in Media Art' was designed to develop shared practices for the care and preservation of time-based artworks. In 2007, as a result of the first Matters in Media Art, MoMA hired its first Media Conservator.

Shortly thereafter, MoMA began, with the help of a panel of external experts, to look more closely at the systems and processes it had in place to manage its digital collections materials belonging to time-based media artworks, knowing that its existing collections management system did not provide the functionality to meet their future requirements for storing and caring for digital collections materials. Over a three-year period MoMA's conservation department refined the functional requirements for a system that could meet these needs. In 2013 Ben Fino-Radin joined the team as Digital Repository Manager, to develop and implement a plan for realizing MoMA's defined goals and requirements. .

Although MoMA had initially considered building their own proprietary system from the ground up, in early 2013 it was found that existing open source systems could likely be adapted to suit MoMA's needs. Furthermore, it was realized that a new proprietary system would be harder to manage as the system would not have other users or the economies of scale associated with a single point of support for a group of users.

Archivematica was identified early on as a potential solution to meet MoMA's requirements and it was fairly straight forward for the team at MoMA to do some hands-on testing without any major need for system integration or complicated set up, due to the availability of a downloadable virtual machine containing a fully configured Archivematica system. The team at MoMA installed this virtual machine on a Mac to test the system at a very general level. This virtual machine, which ran Ubuntu open-source operating system, could run in

either VMWare or Virtual Box with low complexity (taking the pain out of configuration for a user initiated demo is clearly a good tactic for open source projects seeking to get distribution of their outputs). The fact that the package could be downloaded to run locally was also important for MoMA as a public test website was not suitable, understandably they could not use their collections material within a public environment for security reasons.

MoMA found that the Archivemata software met about 40% of their requirements; mainly those associated with ingest procedures. It allowed them to create Archival Information Packages (AIP's) and the system was based on the Open Archive Information System (OAIS), which was one of MoMA's defined functional requirements. After fully vetting Archivemata, MoMA approached Artefactual Systems who are the managing company behind the Archivemata open-source software and engaged them to look at running some testing of the software in a true production environment, that of MoMA's data center and enterprise grade hardware.

It was found that some things were happening a bit slower than possible, utilities such as F.I.T.S. (File Information Tool Set) that had been coded to run in single Java instances could now be run in batch mode increasing throughput and speed. Thought was devoted as well to what the ideal amounts of memory and CPU were for the optimal performance of Archivemata in MoMA's environment. Therefore the initial development around Archivemata was primarily dealing with optimizing Archivemata itself, and optimizing the powerful computer infrastructure available at MoMA. By working with MoMA the Archivemata codebase was advanced providing a wider benefit to the user community.

Archivemata however did not meet roughly 60% of MoMA's specific requirements with regard to managing data and triggering actions such as reports based on specific information such as file formats, or file characteristics. These remaining requirements went to tender. Artefactual Systems responded to that tender with a proposal around their other open-source software tool AtoM. AtoM is fully web-based, multilingual, archival description software that was originally commissioned by the International Council on Archives, Artefactual are also the lead developer of the AtoM application. Artefactual proposed that this software, at its core, delivered much of MoMA's remaining requirements and that it could be modified to meet the more specific or advanced needs. After evaluating alternative options and vendors, MoMA decided to go with Artefactual and AtoM.

This project involved stripping the software down to its core and building it back up to better meet the needs of a museum. The way in which AtoM managed information based on archival description concepts or attributes such as Fonds, Series, Item was not relevant to MoMA requirements. Having previously looked closely at information seeking behaviors of their users, how they look for a work, it was recognized that AtoM was built for public access and therefore was light on the type of metadata that a MoMA user would need to perform certain searches relating to an artwork. For example how a conservator might interrogate a database to collect information relating to an item such as characteristics to do with video codec or file types.

Digitization of audiovisual assets has been ongoing at MoMA over the past 4 years and the core development of the solution began in early 2014. The overall system was deployed live in Sept 2014. MoMA has developed a complete solution to their needs based on two open-source applications, optimized to run on their hardware and supported through a contract with Artefactual. MoMA has in fact three levels of support when it comes to their solution: that provided by Artefactual at the application level, the MoMA IT department who keep the servers spinning and the resident repository manager, Ben Fino-Radin. This case study is a great example of how an organization can take open source

technology and develop it further to meet very specific performance and user requirements, by working with a third party to perform development and technical support. MoMA have avoided what may have turned out to be a more expensive and proprietary system. Despite steering clear of this pitfall, optimization and customization of Archivemata to effectively handle the nature of MoMA's digital collections did indeed require significant investment. As these optimizations were contributed to Archivemata's open-source code base, they will serve to the advantage of future users, helping the community and supporting the growth of industry partners like Artefactual.

2.3.4 Netherlands Institute for Sound and Vision // University of Twente and Radboud University (Johan Oomen, B&G)

The Netherlands Institute for Sound and Vision (NISV) is one of the largest audio-visual archives in Europe. The Institute preserves a major part of the Dutch audio-visual heritage and makes it accessible to potential users. The collection totals over 700,000 hours of television, radio, music and film.

NISV has a long history of collaborative and applied research projects with academic institutions in the Netherlands, the relationship with UT goes back 12 years. NISV have an internal Research and Development department which keeps a close eye on developments across the technical universities and seeks to match emerging needs from within the institute with fundamental research undertaken at the universities in an effort to engage in further applied research and development activities that target solutions for the audiovisual archive.

In 2010 NISV created a memorandum of understanding (MoU) with three technical universities (next to UT also University of Amsterdam, VU University Amsterdam) and at that time identified emerging needs in the area of search and retrieval of radio broadcast recordings. NISV sought to automatically annotate and index its archive through the use of automatic speech recognition technology, more specifically NISV sought to create text transcripts of the spoken word content of the radio broadcasts and to be able to identify individual speakers within the recordings.

University of Twente (UT) is a university located in Enschede, Netherlands. It offers research and degree programs in the social and behavioral sciences and in engineering. The HMI lab does research into multimodal interaction: from brain computer interfaces to social robots. It is a multidisciplinary group in which computer science meets social science to investigate and design and evaluate novel forms of human-computer interaction.

The Centre for Language and Speech Technology (CLST) provides research, services for application development, and consultancy in the area of language and speech technology. CLST is embedded in the Department of Language and Speech of the Radboud University Nijmegen (RUN). CLST also comprises the Speech Processing Expertise Centre (SPEX), which is specialized in the validation of speech databases.

Project 1. Speech recognition

SHoUT is a Dutch acronym for: '*Speech Recognition Research at the University of Twente*'. The University has a long tradition of fundamental research in this area and had

been funded by the NWO (Netherlands Organization for Scientific Research). The SHoUT open source speech recognition toolkit was developed by Marijn Huijbregts during his PhD research at the University of Twente.

NISV had two specific requirements in the area of audio analytics, the first was to be able to create text transcripts of radio broadcasts in the Dutch language using automatic speech recognition to enable text based search the broadcast recordings. The second was to apply speaker recognition technology to detect where particular speakers appeared in the radio programs, also called diarisation, to enable the recordings to be searched by contributor or grouped based on speaker appearance.

NISV approached UT in order to investigate further the functionality of the SHoUT Toolkit specifically the transcription modules in line with their specific needs for searching the radio archive. They felt that the toolkit as described purported to provide the functionality that they were looking for and sought to engage with Marijn in a project to evaluate the operation and precision of the system on NISV test materials.

Marijn had set up a spin out company with Roeland Ordelman a colleague from the University of Twente called X-MI (an abbreviation of X (Cross) Media Interaction) in order to commercialize the outputs of the research he had conducted at UT and to engage in applied research projects. Through X-MI NISV invested in a project to create a working demonstrator of the ShoUT toolkit that could be used on a test group of the NISV radio recordings and would allow NISV to evaluate the technology over a phased trial project. This system is now production ready.

The fact that a spin-off had been created by the university, provided comfort to NISV in terms of having support for the SHoUT which is an open source toolkit. X-MI can provide NISV with support for the technology going forward and modify it to meet emerging needs or workflows in the future. As NISV do not have an internal development team with specialization in this field this was a great benefit. This approach to productization of research outcomes is attractive to a larger organization as it enables a lean prototyping process to be undertaken with a small team of specialists in line with very specific needs. This agile approach significantly de-risked the project for NISV as it did not have to expand or direct internal development resources towards the productization stage and by working with X-Mi they will be able to support the application going forward through a third party support contract. For X-Mi working with NISV is a fantastic opportunity for a start up to cover the initial development costs of productization with money from a 'customer' where it can often be difficult for start up companies to attract significant equity investment at the pre-revenue stage. This model provides an effective route to cover early operational costs and create the important first case studies to validate the product in the marketplace. Nothing validates a new technology or service better than the market's willingness to pay for it!

Project 2. Speaker identification

A second project developed in 2014 and related to the speaker identification has required the collaboration with RU. The process was broken down into two specific stages, the first stage was a proof of concept phase that lasted for 6 months that was subject to a range of test criteria followed by a proposed second stage on successful completion of the tests. The primary test objective during the first phase was to evaluate whether the toolkits algorithms could be used to effectively cluster NISV's radio programs based on the appearance of speakers.

Phase 1 ran for 6 months and during this time 2 Marijn and Roeland (within his engagement with Beeld en Geluid) worked on the project to develop tune and test the

speaker identification tool on the test materials that NISV had provided. They also worked closely with the team at NISV to scope the integration of the technology at the archive and created a technical plan for implementation during Phase 2. This phase completed successfully and the project has entered in Phase 2, which is scheduled to run until the end of year 2014. In addition to the technical integration of the speech analysis tools into the technical workflow at the archive, the second phase of the project is also concerned with the development of graphical user interfaces to allow users to search and retrieve recording from the archive using the index created through the speech analysis toolkit. Similar to the project on speech recognition, the result of the Speaker identification will be 'serviced' by XM-I. It will be put in production in 2015.

2.4 Conclusions

These four use-cases have shown how collaboration and information exchange can foster the adoption of research results at a production level. This is the greatest challenge that research has because the gap from the research result and the development of an efficient tool ready to be integrated in a professional environment is a complex process that rarely succeeds. This is where the result of "linking" projects can prove its effectiveness to bridge both ends through exchange. This is probably one of the strong outputs of Presto4U and the reason for being of the PrestoCentre as an intermediary stakeholder between emerging research results and its presence in the market.

As better described in the following chapter regarding results and perspectives of the project, the needed actions may be totally different depending on the Community of Practice. In some communities clear identified solutions are expected; in many others the work is only starting and only after a continuous consciousness process needs and tools will be identified. It is also important to mention the potential conflict existing among medium and large institutions between the IT department and the Archive. These conflicts arise when there is little communication among both, and also in large institutions in which the IT has a very strong role and tend to impose the technological choices, disregarding the specific necessities of the archival process. It is also devoted to IT department to better understand and consider the particular demands of long-term preservation.

3 Satisfaction Surveys on the role of the project

Below will be listed the feedbacks received from every CoP leaders through “satisfaction” questionnaires about the highlights and the impact of the Presto4U project, emerging needs for the community, development of research and adoptions of new solutions. Finally, a general comment on the quality of the project, its future developments and other potential issues is included.

3.1 TV, Radio and New Media CoP

1. Which are, from your point of view, the highlights that occurred during the project?

The space of a networking project allows for a dedicated opportunity where people that are involved can answer the necessary preservation questions for their organization. Having the chance to reach out to and involve not only the people in charge of (much needed) outreach events and projects but also those who do the behind-the-scenes work is invaluable. George Blood³, during a training session, once indicated that more important than the slides during the training, were the people in the room: the ability to call people up when questions arise, the knowledge that comes from not just success stories, but also from the failures that lead to insight, can only come from interpersonal networks that have given a boost thanks to projects like these.

Much valued by the participants were the webinar series that the project engaged in. The TechWatch reports are an equally important forum for sharing knowledge about developments in the wider domain. The survey for knowledge building about the community was a very valuable tool in and of itself, but its timeliness and structure would have been much more usable if there had been more coordination between the various communities. Knowledge building efforts such as these take place within various communities – also EBU, AMIA and FIAT/IFTA regularly undertake or are planning to undertake this type of survey, and the field would truly benefit from a better intra-organizational coordination effort between all involved.

2. Did you find that your reference community was articulated and well structured?

The broadcast domain has many groups and organizations that work on overlapping ideas and topics. Many of those treat digital preservation as a specific topic, but specific guidelines are often harder to find. Many of the Presto4U members are, after many years of collaboration within the cradle of the Presto-series of research projects, involved in several of these initiatives. The broadcast CoP has worked explicitly close with the FIAT/IFTA commission on Preservation and Migration. Weekly meetings were set in place, which often suffered from technological and language barriers, but nonetheless were an important benchmark for structuring the discussion.

The project in this regard has managed to attract well-known experts in the field and cross some territorial divides. Where the reference community has fallen short, is in attracting the people who have fewer answers and fewer insight into the existing challenges of digital preservation: managers and IT experts who are too involved in solving the daily problems

³ From George Blood LP; <http://www.georgeblood.com/index.html>

and are not allocated the necessary time to keep up to date with developments in the wider field.

The CoP expert community was a very useful group that much appreciated the discussion. The wider group of people reached through blogs and newsletters were caught in a rather wide net. Where the broadcast community fell short, was in establishing a level in between: the wider net of knowledge sharing between experts of different levels, through the forum or newsletters. There is work to be done in this regard.

3. What has been the impact of the project on your community of practice?

The project has provided a space for discussion. In this regard, the visible impact is rather small. It has allowed reaching across bridges and domains. Most valuable has been the cross-dissemination with other domains, for instance at the workshop in Copenhagen or the preservathons, where community members who are more used to operating within the 'silos' of their profession can find out about the overlap of issues between the different domains.

4. Did the project have some influence on the concrete choices of your community of practice members?

Absolutely. The project already employed a number of experts from the broadcast domain who were readily involved in other parts of the project. Assembling the core expert group therefor depended on a choice of variety and of involving existing networks. There was a large overlap with FIAT/IFTA's Preservation and Migration Commission, to which an expert from the US domain, an expert from an emerging institution and an expert in OAIS were added.

5. Do you think it is easy for institutions to adopt new solutions? What are the barriers that mostly prevent the adoption of a different solution?

One of the most interesting cases in the broadcast community at this stage is the newly set up VIAA archive in Flanders, Belgium. As the organization itself is brand new and integrates a host of both public, commercial, regional and non-broadcast collections, it is at liberty to re-invent its paradigms and set up its systems, technologies and work practices according to the best experiences from other archives in the domain. It is therefor one of the first to set up a fully OAIS-compliant AV archive and can freely choose its optimal preservation format –a task made complicated enough due to the never-ending development of the optimal standard.

In existing organizations, following best practices is of course not an impossible task. Yet in many broadcast environments, the infrastructure has developed throughout the decades and large amounts of dependencies need to be taken into consideration before novel implementations are selected. An interesting development herein is that archive departments are taking up the task in some organizations to teach the production part about the decisions it should take up front to guarantee proper preservation practice at a later stage. At organizations where the archive has this role (e.g. ORF) taking up new solutions is much more engrained in its responsibilities than in an organization where the archive is kept at bay – a reality for many organizations, still.

6. What are, in your opinion, the improvements to be implemented that would benefit the whole community?

Openness about work practices, specifically lessons learnt about decisions that were not the right ones. Cross-domain cooperation with IT experts. Useful examples of the OAIS model implemented for a large-scale audio-visual archive. The QC guidelines as set forth by EBU in the past year are a very useful example of a community effort for the benefit of all.

7. *Do you think that the problems mentioned above can be solved with the help of another project (along the lines of Presto4U)?*

Cross-domain networking always has its benefits, specifically in areas where innovation is much needed. There is currently a large disparity between archives that have gone through the digitization process and archives who are still largely dependent on analogue work processes. This is a gap that needs to be closed urgently. Reaching out remains especially important for archives with smaller budgets that need research outcomes to make their operations as efficient as possible.

8. *Are you, as a CoP Leader, happy with the impact that the project has had in these two years?*

It would have helped had we, as a project team, managed our own expectations better – any project group at some point needs a project to work on together, which was lacking both for the broadcast cop itself and the community of community leaders.

9. *What should be explored next?*

The significant properties of broadcast programs. Persistent access to broadcast items and referencing them for non-archive users.

3.2 Sound and Music archives CoP

1. *Which are, from your point of view, the highlights that occurred during the project?*

Concerning the S&M Community, two major highlights: identifying a large number of institutions concerned by Sound archiving in Europe (more than 300); the particular preservation need of Music archives concerning the conservation of digitally produced music in all musical domains (pop, classic, electronic).

2. *Did you find that your reference community was articulated and well structured?*

It depends, for the Sound community; there are important international federations or associations⁴, which have been working for more than 30 years in issues related to the preservation of sound-recordings. These associations have dealt quite well the passage to digital sound-recordings and have published important reference guides like TC04 by IASA. They are equally very active in guidelines regarding digital preservation. Other federations or societies of members continuously work on technical issues regarding sound recording and reproduction, which keeps the community well informed.⁵

⁴ FIAT/IFTA (International Federation of Television and Radio Archives): <http://fiatifta.org/>. IASA (International Association for Sound and Audiovisual Archives): <http://www.iasa-web.org/>

⁵ AES (Audio Engineering Society)

Also, sound preservation poses today lesser problems than the video domain, and this for very practical reasons:

- a) High quality digital sound formats, good for preservation were established quite early in the history of digital contents and the number of formats has been quite reduced which simplifies the decision of getting into the digital world. Today's formats are considered as an equivalent to an un-compressed audio signal.
- b) Storage space is easily available for sound, even for large collections the needed storage is hundreds of times smaller than for video and thus has permitted quite early to start digitization
- c) Availability of machines for analogue to digital migration and a limited diversity of sound-carriers permitted to advance quickly with no major machine obsolescence issues.

This situation has led to a fast analogue to digital migration process, with established digital audio-formats and where very early initiatives were undertaken that have permitted large collections of sound archives to be totally digitized by now and with a long-term digital preservation perspective.

For the Music Community the situation is very different; on one side whenever the possibility of digitizing audio recordings was possible, this has often been done following the best practices issues described earlier.

However a crucial aspect of Music Archive preservation concerns the recording sessions as a unique environment containing hundreds of files linked to a musical project through proprietary software (like Pro Tools or Digital Performer). These recordings are very often reused to do remixes or new versions of earlier recordings and most of the information related to the context, the choices, the organization of the mixing is usually lost. There is a real need for tools and environments capable of keeping all the information related to the production process and all the necessary elements (audio files, plug-ins, mixing actions).

From a commercial point of view this has a very high impact in musical production companies (like Sony or EMI), how base their business model on the re-exploitation through remixing of previously recorded music. Even if the elements are their under the form of hard-disks or storage tape containing mixing sessions; the necessary information needed to exploit the recording is lost an the environing software can become obsolete very quickly.

3. What has been the impact of the project on your community of practice?

It permitted to understand the level of knowledge among the Sound Community, the good information about best practices and the way sound archives deal with preservation and digital preservation.

For the Music Community, it created community awareness (you are not alone with your problems!) and understanding of methodologies needed to be put in practice in order to assure a minimum organization of contents in the perspective of an archival process.

4. Did the project have had some influence on the concrete choices of your community of practice members?

No special influence for the Sound Community, however confirmation of the preservation state of sound collections and the fact that probably it is the best structured community in terms of knowledge and practice, with no identified technical needs.

The main outcome for the Music community was to discover how many institutions or companies were concerned with the same issues. Starting from the contemporary

electroacoustic institutions which were already conscious of the necessity of tools for production archiving, progressively recording companies, music museums and even individual sound producers were interested and found concern on their common issues. For both communities the importance of the OAIS model is starting to be considered even if independent tools often assure the management of the preservation process.

5. Do you think it is easy for institutions to adopt new solutions? What are the barriers that mostly prevent the adoption of a different solution?

In the case of Music, the need is for effective tools that will respond to their problems. The first step in the Music community was to precisely explain the nature of the work to be done to keep the already existing productions and from there onwards conceive tools that will simplify and structure the archiving process for future reuse, preserving and transmitting all the necessary information. Some tools are starting to be developed⁶ which are quite promising for the documentation actions done during the production process. The general concept is to capture all events produced by a user and through the user's preferences create hierarchies in order to capture the essential information related to the production.

In the Sound community, the situation is quite different; collections contain mainly recordings of events, radio programs, conferences which are a testimony of an event; in the Music community what needs to be preserved is the musical work itself with a very important risk of loss. However, independently of technical considerations, the main barrier is financial and also related to the existence of institutions with a long-term perspective. The Cloud is proposing storage farms, which can have some impact in the way data-preservation is assured. There are also interesting expectations related to Blu-ray disks and their longevity.

6. What are, in your opinion, the improvements to be implemented that would benefit the whole community?

For the Music Community some work has been done concerning the needed actions that need to be undertaken in order to assure a preservation process, however this work is mainly theoretical with a series of guidelines concerning how to organize documentation before archival, the indispensable related items, the nature of the used software and its updating actions. The difficulty is that they represent many different actions with no adapted management tool that will structure, follow and check the process (a kind of process orchestrator that would limit risks of missing components).

7. Do you think that the problems mentioned above can be solved with the help of another project (along the lines of Presto4U)?

For the Sound community, no special demand or need, for the Music community, specialized archiving tools associated to production are definitely a need that increased with time due to the complexity and the diversity of productions (a usual music mixing is not only hundreds of sound-files in a proprietary environment but also many plug-ins from several different developers and companies). Obsolescence and integrity of contents is indeed the main danger.

⁶ The GAMESLAN project financed by the French National Research Agency from 2011 to 2013 has worked in this direction, <http://ercim-news.ercim.eu/en86/special/managing-and-archiving-digital-audio-the-gamelan-project>

8. *Are you, as a CoP Leader, happy with the impact that the project has had in these two years?*

The impact was slow to build, on one side you find the Sound archiving Community, already well structured and conscious of the problems, challenges and issues and with a high level of information exchange and dedicated conferences to deal with their issues. On the other side the Music Community is not well structured, content owners are often not conscious of their problems or that they share common concerns with other actors of the same community.

9. *What should be explored next?*

Next steps, mainly in the Music archiving domain, are intelligent tools for organizing the archiving and exploitation issues associated to the production process. Human made documentation is too long to succeed and the production environment doesn't provide the tools and time needed for these actions. Self-describing environments configured by users in function of the kind of expected reuse would be the most outstanding need for this community.

3.3 Video production and postproduction CoP

1. *Which are, from your point of view, the highlights that occurred during the project?*

Through interaction, marketing, and business-based relationships TV 2, responsible for this CoP, 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 the 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.

2. *Did you find that your reference community was articulated and well structured?*

It is difficult to generalize given the heterogeneity of users and business sectors (we are dealing with at least 10.000 companies in Europe) and the consequent different interests that each one brings forward. The gaps between the different sub-communities, their communication across business-related borders, and awareness to cost-efficient solutions

more than on rational intelligent use of shared assets and needs, affect the cohesion and thus the ability and willingness to cooperate and solve common problems. In this domain there is an abundant technology development for media asset management, file formats and wrappers, file transfer methods, digital archiving systems, but given the still insufficient standardization among stakeholders, problems like interoperability and compatibility are key issues likely to occur.

3. What has been the impact of the project on your community of practice?

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 more or less indiscriminate blogs or interest groups have only addressed post-production peripherally. 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.

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.

4. Did the project have had some influence on the concrete choices of your community of practice members?

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, 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 them, the “The Reluctant Revolution”.

5. Do you think it is easy for institutions to adopt new solutions? What are the barriers that mostly prevent the adoption of a different solution?

Even though stakeholders individually are very keen to make improvements, conventions and more consistency to reach consensus for a more efficient collaboration and organization 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 consensuses in future.

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 standardization and infrastructure into this particular area. The core-expert has called this important issue for the double gap.

6. What are, in your opinion, the improvements to be implemented that would benefit the whole community?

There is a need for ‘lighthouses’ and attractive business cases and models. Therefore the core experts find the actual DPP-initiative⁷ 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 centre 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.

7. Do you think that the problems mentioned above can be solved with the help of another project (along the lines of Presto4U)?

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-ups and dissemination tasks within this area.

8. Are you, as a CoP Leader, happy with the impact that the project has had in these two years?

The presto community was really good to be a part of, a lot of very skilled people that were willing to help and give good advises, so we definitely enjoyed the community and all the talented people there were involved. One thing that has had a negative impact was the size of the project, as we would have preferred a smaller project, with a clearer and stronger end goal.

9. What should be explored next?

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

⁷ The Digital Production Partnership (DPP) is an initiative formed by the UK's public service broadcasters to help producers and broadcasters maximise the potential of digital production. <http://www.digitalproductionpartnership.co.uk/>

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.

Exchange, transportation and reuse of video assets are 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, and 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.

3.4 Film collections and filmmakers CoP

1. Which are, from your point of view, the highlights that occurred during the project?

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 supplanted with mature solutions, even if financial models and long-term sustainability is still a challenge in many places. In a sense, the technology is no longer an issue, but the financing and practical implementation is still lagging behind.

The CoP on film addressed some crucial issues in digital preservation, not the least through a webinar on Master Archive Package (MAP) creation and a workshop in September 2014 on digital storage and formats.

2. Did you find that your reference community was articulated and well structured?

The film community, as far as preservation institutions is concerned, has a relatively well-established network in FIAF and ACE. 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 in FIAF and ACE have a framework for discussions and exchange of skills and knowledge, but there is a serious 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, partially 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 opportunity to network and share knowledge beyond what would otherwise have taken place.

3. What has been the impact of the project on your community of practice?

The project has offered an opportunity to bring together people from different groupings in the film sector. As such it has been instrumental in making connections across institutions

and people that 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.

4. Did the project have had some influence on the concrete choices of your community of practice members?

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 people 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.

5. Do you think it is easy for institutions to adopt new solutions? What are the barriers that mostly prevent the adoption of a different solution?

For the film community many digital solutions are being used in the production phase, while distribution is very standardized 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 organizational 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. While analogue film preservation allows passive storage for centuries, if performed according to best practice standards, the digital preservation of motion picture films requires on-going migration and a digital storage setup that 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, in order to implement expensive digital solutions that might not be what they promised to be, thus endangering both the analogue and digital collections.

6. What are, in your opinion, the improvements to be implemented that would benefit the whole community?

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 Heritage⁸ 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

⁸ http://ec.europa.eu/archives/information_society/avpolicy/docs/library/studies/heritage/final_report_en.pdf

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.

7. Do you think that the problems mentioned above can be solved with the help of another project (along the lines of Presto4U)?

The project has been beneficial and relevant for the film community in the sense that it has helped 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, and unfortunately has limited overlap with for instance IASA, from which input would be valuable.

8. Are you, as a CoP Leader, happy with the impact that the project has had in these two years?

It has been a challenge to lift the task as a project member not having been involved in the Presto projects leading up to Presto4U. While the community building was largely possible based on the fact that the film heritage sector had some coherence already, the synergy and communication across the project has been a challenge. Much of the effort in digital communication, virtual meetings and different online dissemination activities might have been better used in physical meetings to create a cross sector understanding.

While the project tried to address, and described clearly, the goal of bringing together researchers, technology developers and users/customers, it also internally has been maybe too focused on delivering reports and written materials, while missing the opportunity to bring together the partners and CoPs under less formal circumstances. In a sense there has been an internal network (technology partners) and an external network (the different CoPs). While the two “networks” have largely been successful, the goal to bring them together did not fully come to fruition.

9. What should be explored next?

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. Also, 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.

3.5 Footage sales libraries CoP

1. *Which are, from your point of view, the highlights that occurred during the project?*

The main highlight reached in the project for the Footage sales community has been the effort (the first real one of this kind) to raise awareness on long-term digital preservation issues and to create a group, representing different kinds of institutions in this community, to formalize and discuss these issues. An apparently simple task, but not at all in a market-driven environment, like the one of footage sales, in which competition between stakeholders operating on the same market could sometimes affect the effective willingness and ability to share key knowledge and best practices.

2. *Did you find that your reference community was articulated and well structured?*

Commercial audio-visual libraries and archives span from the big broadcasters sales divisions (e.g. BBC Motion Gallery or ITN Source) to small stock footage companies specialized in niche topics. Considering its composition, this Community could potentially overlap with the one of Broadcasters or also the one of Film archives and Video production and post-production companies.

Anyway, since decades, FOCAL International, which is the International Federation of Commercial Audio-visual Libraries, represents most of the stakeholders in this community. FOCAL International gathers together more than 300 companies and individuals involved in stock footage sales, media production, assets management, film restoration and post-production. This trade association usually offers to its members training workshops on different topics like metadata standardization, IPR issues or digitization, keeping the community updated also on a technical level on different subjects also through a quarterly magazine distributed to all members. Every year FOCAL also organizes a training week with visits to footage sales archives and lectures on different topics, from film restoration to digital asset management systems.

So, this community, despite the very different kinds of subjects involved, has been historically well structured. This is why 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.

Despite this good internal organization and the regular training opportunities, 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 digital assets management systems, digital file formats and standards for descriptive metadata and rights management for the development of an interoperable marketplace of footage sales. The challenges of digital preservation are often seen –wrongly- as long-term issues that do not impact directly the daily operations of the commercial archives.

3. *What has been the impact of the project on your community of practice?*

First of all, it raises awareness on the importance of digital preservation also for commercial archives, trying to extend the community knowledge of the methods, tools and services needed to preserve audio-visual digital collections on the long term.

In connection with the above-mentioned result, it also unveiled the lack -in large part of the community- of concrete strategies and plans for long-term digital preservation of audio-visual assets.

4. *Did the project have had some influence on the concrete choices of your community of practice members?*

As mentioned before, the project has mainly raised awareness on the importance of digital preservation practices, but at this stage it has not yet directly influenced concrete choices in that direction.

Most of the institutions in this community easily recognize the importance of investing in cataloguing systematically their audio-visual assets and also in digitizing them, in order to provide easy and fast access to customers. But investments in long-term digital preservation are still not a real priority.

5. *Do you think it is easy for institutions to adopt new solutions? What are the barriers that mostly prevent the adoption of a different solution?*

As already stated, one of the main issue 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.

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.

Anyway, when also crucial activities, such as digitization, 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.

6. *What are, in your opinion, the improvements to be implemented that would benefit the whole community?*

Considering what we said above, the most beneficial action for the footage sales community would be an intensification of the awareness actions regarding digital preservation best practices also with the organization of more physical workshops, and maybe also strengthening the collaboration with FOCAL for maximizing disseminations results.

Stakeholders in this community should be, first of all, convinced with concrete examples of the return on investment when implementing long-term digital preservation plans.

7. *Do you think that the problems mentioned above can be solved with the help of another project (along the lines of Presto4U)?*

Looking back and learning from the past experiences, I'd say that investing largely first in awareness raising actions in each community would have been beneficial. A new project that would go in that direction could be of help.

8. *Are you, as a CoP Leader, happy with the impact that the project has had in these two years?*

Project impact in this community has been slow to reach and not fully satisfactory, to be honest. Involving people from the community in the project activities has been quite difficult and very time consuming. Looking at the experience in setting up and working with the community of practice members, I think that organizing more events that brought people in the community face to face, rather than involving them only through newsletters/webpages and webinars, would have been more effective in actively engaging people and raising awareness on the project objectives.

Another issue that complicated a broad impact of the project in this community is that most of the stakeholders operate on a commercial and revenue based model, and especially small institutions cannot afford to invest time on a voluntarily basis to produce general mid/long term outcomes for the rest of the community. As mentioned above, also market competition issues between stakeholders tend sometimes to affect their effective willingness to share knowledge and best practices and start a fruitful collaboration.

So bottom-up awareness raising actions have been difficult and slow to start and experiences and best practices in digital preservation have been not always easy to share between members of this community.

9. *What should be explored next?*

Once awareness about the need of digital preservation practices will be broadly developed, tools that help putting together digital preservation needs and the offer coming from the industry or research in this field will be an interesting field to explore and offer to all the community members. Such tools have been developed in Presto4U only towards the end of the project, that unfortunately lasted only 24 months, and so we didn't really have the opportunity to fully test them and disseminate them to our communities.

3.6 Research and scientific collections CoP

1. *Which are, from your point of view, the highlights that occurred during the project?*

Two are the highlights from the Research and Scientific Collections CoP: a community was built from scratch connecting people that had never met before the Presto4U project; awareness has been increased between the members about audio-visual digital preservation issues they didn't even know about.

2. *Did you find that your reference community was articulated and well structured?*

The community did not exist before. Even now, there is no structure and the community mostly lives because of the connections between the members and the CoP leader. There have been three main obstacles to the establishment of the community. First, members are involved in much different research fields ranging from computer science to humanities. Second, they have many different levels of ICT knowledge. Third, they do not have any obligations in preserving their collections. Thus, their interest in digital preservation is limited.

3. *What has been the impact of the project on your community of practice?*

The impact has been huge, because even if only a “weak” community was created, it far more than nothing. Moreover, we contributed to increase the awareness on digital preservation of relevant collections. Finally it is largely accepted that to achieve the open science goals that include giving open access to research data, audio-visuals preservation must be seriously taken into account.

4. Did the project have had some influence on the concrete choices of your community of practice members?

No, at the moment the concrete choices they make in order to preserve their collections are not affected. However, they have much more knowledge about their needs and how to express them. Moreover, they expect to be able to get in touch with suppliers and solutions both through Presto4U web site and personal connections made possible by the project.

5. Do you think it is easy for institutions to adopt new solutions? What are the barriers that mostly prevent the adoption of a different solution?

Two are the main CoP specific issues related to audiovisual 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 cases, 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 audiovisual documents should avoid, as much as possible, change on the reproduced data. Second, metadata are crucial for the use of audiovisual in any recent context. There is lack of awareness within 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., in multimedia information retrieval or in medicine) are very rare. In most cases, it would be very hard to understand the metadata after the researchers working on them will retire. Sharing audiovisual and their metadata helps making more researchers all over the world aware of the particular metadata format. The best-effort approach is very common when considering preservation of research and scientific audiovisual 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 documents used by others) are the main reasons for that. Current solutions they have knowledge about are at the moment too expensive or too difficult to set up considering that they typically have few resources for managing their audiovisual collections and very little technical knowledge.

6. Do you think that the problems mentioned above can be solved with the help of another project (along the lines of Presto4U)?

These CoP members definitively need aggregated sources of information regarding audiovisual digital preservation solutions. Best practices coming from other more advanced CoPs are also very significant for them. Being one of the weakest communities in terms of audiovisual technologies used, they have an enormous benefit in getting in touch with the big players.

7. Are you, as a CoP Leader, happy with the impact that the project has had in these two years?

At the very beginning I expected to find a small but yet existing community. I also expected the members to be more motivated and also to have some obligations in preserving their audiovisual contents. However, given the state-of-the-art I found at the end of the building phase, I'm quite happy with the final results.

8. What should be explored next?

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. 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.

3.7 Learning and teaching repositories CoP

1. Which are, from your point of view, the highlights that occurred during the project?

The project has given us the opportunity to bring together an emerging group of AV practitioners in the field of higher education (HE). This is a very important step for the community since there is a great need for learning and sharing of experiences in this field. Presto4U has given us the opportunity to connect with some of the universities that are implementing digital preservation guidelines and raise awareness among a larger group of stakeholders. Thanks to the group discussions, the questionnaire and telephone interviews we have been able to acquire a clearer picture on the state of digital preservation in this domain and capture the main challenges and preservation needs of the community. It was very interesting to observe how the core expert group's discussions can benefit from face-to-face interactions. One of the main highlights of the project has been the 2 half-day workshops for the education and research communities that took place in Venice on the 6-7 November 2014. More than 30 attendees joined the event to learn more about digital preservation case studies and best practices, including standards adoption for content and metadata. Other workshops organized by the project like the Preservation on storage solutions (RAI, Turin June 2014) have been very well received and have helped participants learn more about capturing requirements. It was also very rewarding to see how small exchanges of knowledge can make a big difference in the field of higher education. An example of this was provided by the University of Innsbruck who had been struggling with the handling of MPEG transport stream files and was helped by one of the project partners. Another highlight has been the series of Presto4U webinars, which have allowed us to reach community members from institutions with no travel budgets.

2. Did you find that your reference community was articulated and well structured?

Learning and Teaching Repositories for audio-visual 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.

Audiovisual practitioners in the Learning and Teaching domain do not currently feel they belong to an established community because the digital preservation activities in higher education are still very sporadic and the exchange of knowledge has been limited to very few initiatives mainly at national level. Cross-collaborations at European level are often restricted to short term projects and good initiatives often lose momentum because of lack of human and financial resources. Also the community does not seem to have a representation in the field of digital preservation at European or International level, being major events targeted at the broadcasting and film archiving community.

However not-for-profit membership organization like Jisc and Digital Preservation Coalition in the UK are playing a key role to bring together practitioners from the higher education domain.

3. What has been the impact of the project on your community of practice?

The project has given community members the opportunity to network and learn from each other experiences. It has also allowed us to create a new opportunity for collaboration and knowledge exchange in the field of higher education. It has enabled us to understand the limits and potentials of the community by analyzing their challenges, barriers and preservation needs. Through the various dissemination activities we have also been able to reach a wider number of stakeholders raising awareness and offering them an opportunity for learning.

During the events organized within the project (e.g. Venice workshop) or attended by KCL representatives (4C/DPC Investing in opportunity conference⁹) 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 organized 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 organizations like Digital Preservation Coalition (DPC) in the UK or the PrestoCentre as a European platform based 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.

⁹ '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 (Wellcome Trust, London 17-18 December 2014).

<http://www.4cproject.eu/community-resources/investing-in-opportunity-conference>

4. Did the project have had some influence on the concrete choices of your community of practice members?

During the group discussions core experts have been able to share some knowledge on existing standards such as EbuCore and PREMIS. The project has also been able to solve one of the workflow problems experienced by a community member with regards the synchronicity of sound and vision when importing MPEG-2 TS-Video files into Avidemux. There has been no influence on the adoption of technology because this falls within the remit of senior management and there are currently no major funding or digital preservation policies in place to sustain long-term plans. Digital preservation is often done as a matter of good and with technology, which might not be scalable and able to cope with the costs of long-term storage and access.

5. Do you think it is easy for institutions to adopt new solutions? What are the barriers that mostly prevent the adoption of a different solution?

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 audio-visual materials falling to the bottom of the list of priorities or institutional strategies.

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 remit. 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.

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 audio-visual preservation is not escalated to those who have the power to impose the change required, or who are the budget holders.

Another obstacle can be the rigid administration of public institutions, where IT departments often make decisions without thinking of scalable solutions or without involving end users who have the knowledge of audiovisual media and workflows. This goes together with the difficulty to express requirements and the lack of understanding between archivists and IT departments, who often use very technical terminology.

Another barrier to the adoption of solution is represented by the challenges around integrating new technology with existing systems. The tools identified within the project may work well as standalone products, but may require a substantial investment to integrate with technology already in place for video or metadata management.

6. What are, in your opinion, the improvements to be implemented that would benefit the whole community?

The needs of this community lie primarily in the better understanding of how preservation and access shall be organized 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 AIMS¹⁰ 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 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 Paper¹¹, 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 Hydra¹², a Fedora¹³-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.

7. Do you think that the problems mentioned above can be solved with the help of another project (along the lines of Presto4U)?

During the Presto4U project KCL has tried to promote cross collaboration with the 4C¹⁴ project using the DPC online platform¹⁵ 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 maximize 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. Another project could potentially continue the efforts of raising awareness and sharing expertise among institutions in the community, but more funding is required in this field to transform awareness into concrete plans.

8. Are you, as a CoP Leader, happy with the impact that the project has had in these two years?

The project has been highly beneficial in laying the foundations for a growing community of practice in a field, which is only starting to adopt digital preservation practices. We are overall pleased with the opportunities we had to raise digital preservation awareness and engage with a good number of stakeholders in the higher education domain. The workshops and webinars have proved really beneficial, however we feel that the community is only starting to bond and requires further support as well as opportunities for networking in the future.

9. What should be explored next?

¹⁰ Born Digital Collections: An Inter-Institutional Model for Stewardship (2009-2011): <http://www.digitalcurationervices.org/aims/>

¹¹ AIMS White Paper: <http://www.digitalcurationervices.org/aims/white-paper/>

¹² Hydra: <http://projecthydra.org/>

¹³ Fedora: <http://www.fedora-commons.org/>

¹⁴ Collaboration to Clarify the Cost of Curation, <http://4cproject.eu/>

¹⁵ <http://www.dpconline.org>

The Presto4U project has offered the opportunity to bring together audio-visual 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. We recommend that PrestoCentre continues to maintain the community spaces and creates new opportunities for knowledge exchange. This could be done by offering better visibility to the PrestoCentre's Answers section and enabling partners to connect with institutions across the various communities. Adding a messaging service and highlighting trending discussions with cloud tagging technology could also stimulate interactions and prompt vendors to join the discussions to further investigate user's needs. The Community for Learning and Teaching should also explore opportunities for cross-collaboration taking advantage of other projects in the field of information management. An example of beneficial collaboration could be moving archive content to a network level to concentrate technical development and reducing costs whilst offering access to a wider number of assets.

At the same time cheaper solutions to perform automatically functions such as metadata extraction and quality control should be developed to cater for the learning and teaching community. Technology providers working in the field of TEL (Technology Enhanced Education) have a great opportunity to include digital preservation as part of their core offering when developing virtual learning environments and video capture tools. Software enabling automatic scene detection and time code metadata would be highly beneficial for the academic community.

3.8 Art & museum object, artists and their representatives CoP

1. Which are, from your point of view, the highlights that occurred during the project?

A major highlight for the video art community of practice core expert group has been the ability to make connections between those working with the preservation of video art in Europe and in the United States, those working within a museum context and those working with private and distributed collections and directly with artists. It has also been encouraging to see tools being developed that are of value to this community and where members of the community are actively involved in their development.

2. Did you find that your reference community was articulated and well structured?

This practitioner community is small and has a track record of collaboration and communication. A decision was made early on to focus specifically on the challenge presented by the move from digital videotape to digital files and this helped to provide a focus for the group. I think that one of the things we learnt regarding the contemporary art community during the course of this project was how to articulate active preservation during the active life of a video artwork, and how this distinguished our practice from the practice of traditional archives.

3. What has been the impact of the project on your community of practice?

I think that Presto4U has served to build the confidence of the community that is actively engaged in the preservation of video art. I think that before the advent of this project there was a feeling that tools were available which this community was failing to access. There has been a greater appreciation of the importance of working together to develop appropriate and accessible tools and workflows.

4. Did the project have had some influence on the concrete choices of your community of practice members?

We were able to gather some of the core expert group together for a training session held in London around the use of FFMPEG and the Bay Area Coalition QC tool. This preceded the discussion regarding the creation of a standard preservation format as part of the preservation workflow. The training created a community of users around these tools within our community. The discussion has impacted the decisions of some of the members of the community and has served to shift and focus the discussion around consistent playback.

5. Do you think it is easy for institutions to adopt new solutions? What are the barriers that mostly prevent the adoption of a different solution?

Most of those working with video art recognize the importance of establishing the workflows, systems and protocols associated with the shift from tape to file, however the extent of the challenge was underestimated. Even institutions that had well-established protocols for tape have found this shift extremely disruptive in terms of the range of skills that need to be involved and also the scale of the infrastructure needed to manage this shift.

6. What are, in your opinion, the improvements to be implemented that would benefit the whole community?

This community would benefit from detailed sample protocols being well articulated for workflows associated with managing video as files. Close collaboration with service providers who can support members of the community for whom it does not make sense to establish these systems would be of widespread value. Training in the use of the tools being adopted by this community is important as well as continued collaborative development initiatives.

7. Do you think that the problems mentioned above can be solved with the help of another project (along the lines of Presto4U)?

Presto4U would certainly benefit from a second phase, however perhaps the next phase would see more emphasis on providing funding to support greater face-to-face interaction.

8. Are you, as a CoP Leader, happy with the impact that the project has had in these two years?

I would like to have seen us get to a position where we can showcase emerging practice and sample solutions and recommendations for all of the members of the community from the single artist to the large contemporary art museum. I think we have a better sense of what this would look like but we are not quite at a point to articulate it.

9. *What should be explored next?*

I think the next step is to try and find ways to show case solutions for different members of the community, to support community focused training, the development of stronger collaboration with service providers and also initiatives to tackle some of the major challenges, which have been articulated through the efforts of this project. For example, the challenges of ensuring consistent playback remain a significant challenge for this community. Members of the community have also expressed an interest in focusing on issues related to artist's film.

3.9 *Personal Collections CoP*

1. *Which are, from your point of view, the highlights that occurred during the project?*

The Presto4U project brought two strong insights for the Personal Archiving Communities; on one side the fact that more and more institutions are collecting contents from users (not only in the audiovisual domain) thus preserving and enriching the national heritage or simply bringing together contents for access. On the other side, the increasing concern by users with the documentation and preservation of their personal digital contents and the need for adapted and easy-to-use tools for cataloguing, annotating and indexing contents as well as guidelines on format issues regarding long-term preservation.

2. *Did you find that your reference community was articulated and well structured?*

Not at all, many initiatives exist among institutions; as national archives that propose content holders to deposit their contents with a heritage perspective. However few initiatives are aimed to enrich existing collections or to develop a structured project in order to bring in contents for preservation with the intention to open them to access.¹⁶ Other initiatives propose users to “hang” their contents on the web in order to provide access (YouTube is a major example), however popular these websites may be, it is only a pin-board with no guarantee on the long-term, no archiving policy and with degraded quality regarding the original content.

For personal uses, some initiatives exist as guidelines¹⁷ or discussion-groups proposing recommendations on how to structure and name contents, as well as a description of the actions an individual should undertake in order to assure long-term access to their contents. Some service initiatives are starting-up, where content holders can store their contents with long-term guarantees, however these types of services are mainly conceived for large collections and institutions either with heritage concerns, or with legal obligations (for example medical records which have to be kept for more than 30 years in many countries).

¹⁶ Three interesting initiatives have occurred in the last years; The National Audiovisual Institute of France (Ina) with its project « Mémoires partagées » (shared memories); asking the public to propose audiovisual contents concerning France on a regional basis <http://www.ina.fr/themes/memoires-partagees/>; the project Europeana 1914-1918 – untold stories & official histories of WW1, <http://www.europeana1914-1918.eu/en> based on contributions from citizens across Europe regarding any kind of contents (including physical objects); the BBC *Memoryshare* initiative: <http://www.bbc.co.uk/dna/memoryshare/home> is designed to collect first-hand accounts of public and personal events or memorable days

¹⁷ *Personal Archiving: preserving our digital heritage*, Edited by Donald T. Hawkins, 2013

Thus, the community is not structured at all; many institutions have personal preservation aims included in their general policy actions, however it is considered as a side activity with less impact than their mainstream preservation missions.

Nevertheless, local initiatives exist in different countries, where associations bring together collection owners contents. These associations have increasing impact with the decaying state of analogue contents and the obsolescence of reading machines. Also personal film collections used to be quite popular and with generation changes there are many lost or forgotten collections, which are eventually given to these associations¹⁸.

Even here, there is no structured action among these associations, which tend to work at a local or regional level with no wide coordination among them.

3. What has been the impact of the project on your community of practice?

Probably the strongest one was to create consciousness among institutions of the wide variety of initiatives that exist in this domain. These initiatives tend to have low visibility and even content-holders are seldom aware they exist. This lack of information among citizens may have some negative effects, as content-holders donating their collections to institutions not at all aware of the challenges of audiovisual preservation and lacking technology, staff and knowhow in order to do it properly. When this happens, audiovisual contents are often kept as objects, with no possibility of accessing the content and if no action is undertaken doomed to disappear through chemical degradation or player obsolescence.

Among personal collection holders, it is the role of the PrestoCentre to develop guidelines, information and best-practice issues as well as being aware of emerging services in the domain, which can answer to users needs.

4. Did the project have had some influence on the concrete choices of your community of practice members?

There were no technical implications in this Community, institutions collecting personal contents either have the capacity or the know-how in dealing with audiovisual digital preservation, in which case this activity is just an extension of their normal activity; either they have no knowhow, in which case there is a high risk of loss for contents.

For personal archiving, it is not a technical issue; it is more an organizational process that has to be established. At the same time there is a strong uncertainty here regarding the evolution of the digital environment. While preservation was thought some years ago as a local initiative (for institutions or individuals), the emergence of new services and Cloud based storage, is having an impact in the way storage and preservation are understood. Up to now storage services don't include description or documentation facilities, but this could only be a question of time. Users are willing to have transparent services where they just send their contents to be preserved.

5. Do you think it is easy for institutions to adopt new solutions? What are the barriers that mostly prevent the adoption of a different solution?

¹⁸ Some initiatives like *Les Archives du Rhône*, http://archives.rhone.fr/?id=remettre_archives which brings together contents related to the second world war and the « Résistance »; or the *La Cinémathèque de Toulouse*, <http://www.lacinemathequedetoulouse.com/depocinems> where any kind of audiovisual content can be deposited for preservation and/or access.

There is no solution adoption issue in this Community; the main concern is to adapt professional practice to personal domain. One of the main challenges for users is creating a permanent link between the contents themselves and their description. Encapsulated files are indeed a solution but not yet practiced at an individual level; adoption of already established practices in the professional world, at a personal level, is indeed a barrier.

6. What are, in your opinion, the improvements to be implemented that would benefit the whole community?

The first and more important improvement is consciousness! The same process that was observed during the last ten years among professional content holders and the awareness of the incurred high risk for their contents if not structured actions were undertaken, has now to be adapted to personal collections, not at an institutional level, but concerning the important amount of digital contents daily produced by everybody. The success of preservation and storage depends on its description or documentation because it permits to find and access contents based on what they contain. Methodologies and tools are strongly lacking here so users can easily describe and document their contents.

Special features arising in the domain, as geographic location, face-recognition or speech to text, are important features, which help description and identification of context and contents; however tools are needed where the user can introduce hand-made descriptions for further retrieval and access. Unless these tools start appearing in an easy-to-use perspective, we may be in the future in the uncomfortable situation of having preserved heaps of audiovisual material with little possibilities of finding anything. Online tools are definitely an issue in this domain.

7. Do you think that the problems mentioned above can be solved with the help of another project (along the lines of Presto4U)?

Yes, concerning integrated description tools that permit documentation and permanent links between contents and their description, through encapsulated online tools associated to preservation services. Up to today, it was and still is possible for a user to preserve on a long-term perspective his contents, even with an associated documentation. However it is mainly based on the capacity of the individual to create and maintain the preservation environment and based on his regular intervention to check contents, integrity, formats and all the elements, which constitute a potential danger for the survival of contents. A personal user is not an archivist and long-term preservation implies transforming leisure activities as photography, recording or filming in professional ones!

A project working on these issues as well as better imbedding in the production tools, description patterns and self-description issues could have a strong impact in the creative domain, more and more based in the reuse of pre-existing material; material which has to be kept and described properly in order to be simply findable.

8. Are you, as a CoP Leader, happy with the impact that the project has had in these two years?

It was a very interesting progression; the project permitted a continuous contact with institutions receiving collections, content-owners looking for solutions and service providers proposing preservation services with the consciousness that it is an increasing market which will have to adapt to user needs.

Even if technically there were no major challenges (tools for documentation and description are needed in all domains where little archiving expertise exists) the strongest fact is the concern related to our digital environment of preservation on all levels of activity and where personal collections are an increasing fact and push for the market.

9. What should be explored next?

Online services for manual and semi-automated documentation are definitely an issue which needs further exploration. The institutional domain only keeps a small fraction of all the produced audiovisual material and efforts should be aimed so that citizens can understand and handle preservation in a simple and effective way. Evolution of services is then a strong challenge for the future.

4 Final Considerations

Audio-visual recordings of the twentieth century are at risk and digitization is a solution that has brought a new problem: preservation of digital contents. These files have features (size, specific audiovisual formats) not properly taken into account by current technology. We may recommend 'best practices' and proactive interventions are welcome, but they will need three main changes: 1) AV collections should be included in existing digital collections and use technology for digital preservation; 2) technological developments must take into account the outdated media; 3) the mass media and information technologies in general must evolve taking into account the specific needs of the audio-visual sector.

Large digital collections pose a technical management problem and the solution lies in a technology oriented towards digital libraries. Files need maintenance: they require a proper classification and have to be transferred (frequently) to new media, duplicated on request for use and consumption, coded for different access requirements and subjected to validation checks. They need actions on their metadata, in a range that spans from cataloguing to automatic harvesting (for a standardized and global access). Thinking about a manual maintenance for collections of certain size is virtually impossible and exposes to high risks of error. The technology nowadays offers automatic tools for the creation, maintenance and access to large collections of documents, which should be largely spread and used by all content holders.

There are several and different types of stakeholders: contents are largely in possession of distributors, followed by film museums, cultural centers and institutions. But it is not uncommon among their staffs, as well as the leaders who decide and fund technical solutions, to not having the needed skills or to be completely not aware of the technologies applied to digital libraries.

The first encountered obstacle in AV content preservation is to know, understand, fund and make use of the existing instruments in the field of digital libraries, in order to turn a heterogeneous collection in a manageable one.

The second obstacle is realizing that on one hand the digital library-oriented tools facilitate the management (so that the documents become accessible and not lost), but on the other end they don't guarantee its preservation. Digital contents suffer different obsolescence problems that are taken into account by digital technology: methods to ensure that the files in the process of obsolescence can be migrated to new standards and formats, methods for emulating old IT equipment (so as to extend the life time of outdated formats), criteria for updating digital archives, up to an overall methodology as the OAI approach. Among the staff of unprofessional small audio-visual collections it could be hard to find someone that has heard of OAI. This limits access to funding and quality Implementation.

The third obstacle is that the specific needs of AV contents are not fully supported either by digital library-oriented tools or by those that deal with preservation of digital objects.

It is then strongly encouraged the exchange and dissemination of information between archives which play a preservation work and smaller collections that can not afford to maintain obsolete equipment and don't have the option of transferring their assets into digital formats, and even less to provide permanent maintenance of such digital content.

Most of the world heritage audio-visual documents reflecting linguistic and cultural diversity of mankind is kept by relatively small institutions, which cannot be considered archives in the strict sense because of their endemic lack of financial resources. In addition, a considerable amount of international important material is still safeguarded by enthusiasts or by other individuals who, privately, collect it.

These small collections will be able to prioritize their work when they will be aware of common media issues and the actions undertaken by large archives. In many cases large archives may be able to undertake the digital preservation of specific smaller institutions. In this case cooperation at national and international level becomes a requirement. The National Archives that possess a DMSS should consider the possibility of hosting smaller collections, until digital preservation becomes accessible on a large scale.

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