TALLINNA ÜLIKOOL

OSLO AND AKERSHUS
UNIVERSITY COLLEGE
OF APPLIED SCIENCES

UNIVERSITÀ DEGLI STUDI DI PARMA

Naresh Kumar

Expressing the Needs of Digital Audio-Visual Applications in Different Communities of Practice for Long Term Preservation

ABSTRACT

Digital audio-visual preservation is nerve of the research nowadays in this digital world, where use of audio-visuals in creation and storage of research data has increased rapidly. Thereby it has created many opportunities for new problems regarding their maintenance, preservation and future accessibility. Lack of awareness about the preservation tools and applications is a big issue today. To solve such issues a European Commission research project, Presto4U that aimed to enable semi-automatic matching of preservation tools with audio-visual needs has been initiated. To express the audio-visual needs formally it has mapped a knowledge schema. The knowledge schema was first cut and needed evaluation, so it's being evaluated through this study in terms of its ability to represent the Needs of different communities of practice, classes, their association and ability to represent requirements of Audio-visual community through properties of its classes.

This evaluative study is conducted through Qualitative research approach using Interview and Questionnaire as data collection techniques. Interviews were conducted to explain the content of Presto4U inherited questionnaire as the matter related to knowledge schema was difficult to understand. Open Archival Information System (OAIS) reference model is used as theoretical framework because it provides complete guide on how to preserve a digital document for long term. Fourteen members from whole Europe belonging to three communities of practice namely research and scientific collections; Video Production and Post Production; Learning and Teaching Repositories have provided their needs for analysis.

Data was analysed through six different stages. To summarise, in stage 0 matching questions of questionnaire with knowledge schema format was carried out to make sure answers of which question would match to properties of different classes of knowledge schema; In Stage 1varification of above matching process was done using the raw data; In stage 2 the concept of Need was modelled through OAIS reference model and questionnaire to categorise need belonging to any organisation; In stage 3 the data was presented as need concept in class 'Need' along with its attributes; In stage 4 the above consolidated data was put into knowledge schema (KS) with all classes and attributes to check whether KS able to withhold all data or not with respect to classes and their associations; and finally In stage 5 needs were summarised according to type of content such as Audio, Video and Image & functional units of OAIS reference model which it belong to.

The study has discovered that knowledge schema is very useful to express the needs of communities of practice but it is important that data must be collected in such a manner that it can easily fit into the structure of knowledge schema. The data analysis showed that the areas on which technology is desired are storage, streaming, preservation, digital asset management, high resolution. On the other hand Technology to manage metadata, tools for rights management, and metadata schema were technical barriers for the CoPs. The present study have likely to discovered the need of new attribute 'Organisational Asset' for the Class Need to cover variety of questions in expressing certain organisation and its Need. The concept of Need expressed in the knowledge schema is able to grasp the requirements of audio visual community. All the attributes of Need class were very open and covered the data as provided by the member organisations. Regarding the association of the classes it was found that many 'Needs' may have many 'Datasets'. Further research with all nine communities of practice is suggested by using more effective research tools.

Keywords: Audio visual, knowledge schema, Presto4U, Digital, OAIS reference model, community of practice.

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List of Abbreviations/Acronyms

Term	Full form of Term
AIFF	Audio Interchange file format
AIP	Archival Information Package
ALA	American Library Association
ARPASEN	Alliance for Permanent Access to Scientific Information
AV	Audio-visual
AVI	Audio Video Interleaved
B/W	Black and White
CASPAR	Cultural, Artistic and Scientific knowledge for Preservation Access & Retrieval
CCSDS	Consultative Committee for Space Data Systems
CD	Compact Disc
CMS	Content Management System
CNR	National Council of Research
CoP	Community of Practice
DIP	Dissemination Information Package
DPI	Dots per Second
DVD	Digital Versatile Device
EC	European Commission
EDCine	Enhanced Digital Cinema
FLAC	Free Lossless Audio Codec
FLV	Macromedia Flash FLV video file format
FP7	Seventh Framework
FPS	Frames per Second
HDTV	High Definition Television
HTML	Hypertext Mark-up Language
IFLA	International Federation for Library Institutions and Associations
IPR	Intellectual Property Rights
ISO	International Organisation for Standardization
ISTI	Institute of Information Sciences and Technologies
JPEG	Joint picture encoded graph
LPCM	Linear Pulse Code Modulated Audio
LTR	Learning and Teaching Repositories Community
METS	Metadata Encoding and Transmission Standard
MODS	Module Music format
MP3	MPEG Layer 3 format
MP4	MPEG Layer 4 format
MPEG	Motion picture encoded graph
NASA	National Aeronautics and Space Administration
NDAD	UK National Digital Archives of Datasets
NDR	National Data Repository
OAIS	Open Archival Information System
OPAC	Online Public Access Catalogue
PDF	Portable Document Format
PLANETS	Preservation and Long-term Access through Networked Services
PREMIS	Preservation Metadata: Information Strategies
RSC	Research and Scientific Collections Community
SHAMAN	Sustaining Heritage Access through Multivalent Archiving
SIP	Submission Information Package

TAPE	Training for Audio-visuals Preservation in Europe
UML	Unified Modelling Language
VP&PP	Video Production and Post Production
W3C	World wide web consortium
WAV	Waveform Audio file format
WMA	Windows Media Audio

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Chapter 1

1. Introduction to Chapter

This first chapter gives a brief description of the whole thesis. It introduces the background of audio visuals and their preservation. It highlights the definitions of the concepts used in the main theme of the study. It points out aim, objectives, research questions, scope of the study and significance of the problem. The chapter also talks about the research methodology followed to investigate the research topics of this Thesis. The way in which the study is being organised is also mentioned.

1.1 Audio Visual material

In scientific community only research data or papers are usually preserved, while there is little attention to the preservation of audio or video material. Nowadays a great deal of the information is captured in the form of videos, and it is important to know more about tools and technologies for their preservation. As we know video is a sequence of frames displayed with a given frequency. It deals with the recording, reproducing or broadcasting of moving visual images. Technically speaking, video is a file kept in a container (wrapper) like MOV and video content is represented according to a compression scheme like MPEG4. Compression and decompression are done with codecs like Xvid, which is hardware or software which interprets audio-visual (AV) signals and compress or decompress them.

The digital audio-visuals (AV) are becoming a popular way to capture and record scientific data. This enormous amount of audio-visual data needs to be preserved to share it among scientific community now and for next generations. But the huge growth of digital AV's has given birth to new preservation problems for researchers and technologists. Bearing this in mind various preservation projects have been initiated all around the world. One such project is Presto4U, which is addressing the preservation needs for digital AV applications in nine different Communities of Practice (CoP). A conceptual model called "CoP Knowledge Schema" has been created to express the AV preservation needs in a formal representation. The final aim of Presto4U is to provide a semi-automatic matching of the preservation needs (expressed according to the knowledge schema) with the appropriate preservation tools. The aim of this Thesis is to contribute to the Presto4U project by evaluating how the conceptual model is able to represent the "needs" of different Community of Practices.

1.2 Digital Preservation and Significance of the Problem

The digital information stored in hard discs of research organisations throughout the world is quickly becoming at risk of being inaccessible. According to an International Data Corporation study for 2007, 264 exabytes of data were created. In future this data would grow at 57% annual growth rate, faster than the expected growth rate of storage capacity. (Jelitto, 2010). Digital preservation should address changes that certainly occur in hardware or software, in organisational or legal environments. Preserved data must contain metadata or representation information for interpretation of original information and easy retrieval of information.

In the frame of the Presto4U project and this Thesis, we are concerned about the born digital audio-visual (AV) content produced and managed by three Community of Practice: Research and Scientific Collections (RSC); Video Production & Post Production; Learning and Teaching Repositories. The born digital material is acquired by those organisations in three different ways. First through physical media by the intake of AV files stored in CD's, DVD's, flash drives and hard discs. Second through network transfer by direct AV files submission on Internet and satellite receivers and third through live capture systems. As usual, here Long Term Preservation means long enough to be concerned with the impacts of changing technologies, including support for new media and data formats, or with a changing user community.

Information produced by the scientific and academic community is valuable, and it is necessary to preserve it for next generations. But AV preservation is given less importance by the scientific research community. There can be many different reasons behind it. May be that the community keep their AV material in their computers for some years and then forget about it, not giving it enough relevance; they may be facing lots of technical problems which are not addressed by their organizations; they may be lacking awareness of standards and tools used to preserve AV; or their organisations are not following any preservation policy, or are having funding issues etc. So there is need to make researchers aware about the right tools for particular preservation needs. The main goal of the Presto4U project, to find a match between AV media preservation needs with tools used by different communities of practice would clearly address this situation and, if successful, would provide a substantial contribution to the preservation of AV material in those Communities of Practice. Hopefully, this thesis will bring some contribution to the success of the project, by providing an assessment of how the knowledge schema is able to adequately represent the needs of three CoP that are part of Presto4U.

1.3 Aims of the Study and Research Questions

Let us start by defining some of the terms that will be frequently used in the thesis.

Audio-Visual Applications: These are applications that enable audio-visual material to be stored, transferred, used and played on different platforms and technologies.

Community of Practice (CoP): It represents a community that shares common concerns, problems and technological solutions related to long term audio-visual preservation challenges.

Knowledge Schema: It is formal representation of preservation need statements using Unified Modelling language (UML) to express the preservation needs of the Presto4U CoPs. It contains five main classes, namely organisation, need, dataset, functional and non-functional requirements.

Preservation Needs: A statement that expresses the AV preservation needs in specific and technical terms. It may be expressed as functional requirements or non-functional requirements.

Preservation Tools: It refers to type of current and desired technology used by different CoP members to preserve AV media.

Research & Scientific Collections (RSC): It is one of the nine Communities of Practice participating in Presto4U. It is a community of research groups that create and use AV material by conducting research in Cultural Heritage, Medicine, Biology, Geology and Computer Science.

Learning and Teaching Repositories (L&TR): This community is made of higher education institutions like universities, colleges and other technical education institutions. It deals with born digital materials, and particularly at production, collection and re-use of audio and video content.

Video Production and Post-Production (VP&PP): This community is made by companies that are involved in capturing the raw AV content and processing into final content in the form of videos.

1.3.1 Main Objective and Research Questions

As stated before, the main objective of the thesis is to evaluate the adequacy of the Presto4U knowledge schema to represent the preservation needs of digital audio-visual applications for different Communities of Practice. More precisely, the research questions can be articulated as follows:

- Is the knowledge schema of presto4U able to represent the needs of communities of practice?
- Is there requirement of any new class in the knowledge schema?

- Are the properties of Need concept able to represent the requirements of AV communities?

1.3.2 Scope of Study

The study has been undertaken in three different Communities of Practice:
- Learning and Teaching Repositories (L&TR)
- Video Production and Post Production (VP&PP)
- Research and Scientific Collections (RSC)

The Learning and Teaching Repositories CoP has the following seven members:
1. The Open University, Milton Keynes, United Kingdom
2. Iuav University of Venice, Venice - Italy
3. Digital Repository of Ireland at the Royal Irish Academy, Dublin, Ireland
4. University College Dublin, Dublin, Ireland
5. University of Rome Sapienza, Rome
6. Screen Archive South East, Chichester, England
7. University Innsbruck, Innsbruck/Austria

The Video Production and Post Production CoP has the following six members:
1. Parallel40, Barcelona, Spain
2. VET Post Production and Training, London UK
3. Library and Sales department, CCMA- Televisió de Catalunya, Barcelona, Spain
4. Documentation, RTL Nederland, Hilversum, Holland
5. Infostrada Creative Technology, CMI holding, Hilversum, Holland
6. ENEX, Luxembourg

The Research and Scientific Collections CoP has the following eight members:
1. Scuola Normale Superiore, Pisa, Italy
2. University of Siena, Italy
3. University of Hertfordshire, UK
4. W3C, ERCIM, France
5. INRIA Paris, France
6. Technical University of Delft, Netherlands
7. University of Geneva, Switzerland
8. INRIA Lions, ERCIM, France

1.4 Research Methodology

The research is an evaluative study with qualitative research approach conducted through interview and structured questionnaire to access the AV preservation needs of three Community of Practices, as listed above. In the study, a questionnaire available on the Presto4U website was used, together with interviews. The interviews to members of RSC, VP&PP, and L&TR CoPs were conducted at their workplace or, where this was not possible, by Skype, to help them fill the questionnaire and also to get more information on AV preservation needs. The questionnaire and the interview were containing questions related to AV preservation needs, technology, organisational assets and desired tools. Since the main aim of the study was to judge the adequacy of the knowledge schema for its ability to access and represent the AV preservation needs, the study has focused on the analysis of the results of the questionnaire and interviews.

The thesis is organised into five chapters. A brief summary of each chapter is given below:

Chapter 1: Introduction
> Introduction to preservation, audio-visuals, aim of study, objectives of study, scope of study, methodology, citation style and chapter summary.

Chapter 2: Literature Review

Overview of Presto4U, UML, CoP Knowledge Schema, OAIS reference model, Digital Audio Visual technology, challenges, and Research projects working on preservation tools.

Chapter 3: Research Methodology

Introduction to Aim, Objectives, Research questions, Scope with CoP member profiles, Research Methods & Techniques, Research process overview and Limitations of study.

Chapter 4: Data Analysis and Interpretation

Matching Questionnaire with Knowledge Schema format, OAIS based Need representation, filling data in Knowledge Schema format.

Chapter 5: Findings, Conclusion and Recommendations

1.5 Chapter Summary

An overview of whole thesis in brief is provided through this chapter. So by now it is understood that this study is all about the digital audio-visual preservation. The rapidly increasing use of audio-visuals in the process of creation and storage of research data has created many issues regarding their maintenance, preservation and future accessibility. Lack of awareness about the preservation tools and applications is a big issue that is still not enough addressed among the research and scientific community. In this direction some initiatives have started like the Presto4U project that is trying to solve this issue. It will develop software that can semi automatically suggest the right preservation tool for any particular audio-visual (AV) need. The preservation need is being expressed formally using a knowledge schema represented through Unified Modelling Language. This attempts to contribute to the project by evaluating this schema for its adequacy to express the AV preservation need in terms of its classes, their associations and their vocabulary of class properties. The evaluation of the knowledge schema was performed within three Community of Practice: Research and scientific collections, Video production & post production and Learning and teaching repositories. Qualitative research approach was used for this evaluative study.

Chapter 2

2. Literature Review

2. Introduction to Chapter

Literature review deals with finding out what has already happened in the same field of study. The chapter talks about digital preservation, basics of audio visuals, and their preservation issues. The chapter provides also some information about the Presto4U project, the Presto4U knowledge schema and different communities of practice. A brief discussion on unified modelling language is carried out to better understand the knowledge schema. The theoretical framework is also explained in detail. Projects doing research on preservation tools are briefly mentioned.

Harvard Referencing Style has been used for In-text citation and the bibliography. A source titled "Cite them right" (Pears and Shields, 2008) has been referred to get more understanding and accurate use of citations and bibliography in thesis. Online open source software "Mendeley" (Mendeley, 2014) has been used to prepare the bibliography.

2.1 Digital Preservation

ALA (2007, p. 1) defines Digital preservation as combination of policies, strategies and actions that ensure access to digital content over time. The goal of digital preservation is to preserve materials resulting from digitization and information that is born-digital with no analog counterpart. Because of the relatively short lifecycle of digital information, preservation is an on-going process. (Tessella, 2013) There are three main reasons for preserving data. First to obey to regulations i.e. keep information for the time retention set by national and international regulatory bodies. Second, for legal reasons, which may include defence or prosecution dealing with digital information created in the past? Third, knowledge re-uses that deals with preserving the information for future researchers. (Tilbury, 2010)

The main reason of preservation is due to the rapidly changing technology that is making recording systems and formats obsolete. The loss of original content during the process of migration between two platforms is another issue. Preserving a file includes data integrity checking, refreshing of data and migration of data to new preservation platforms in time to avoid loss of information through obsolescence.

2.2 Digital Audio-Visual Media

Image: A collection of pixels (a matrix with rows and columns) is a digital image. Each image has a resolution which can be measured in dots per inch (for example, 300 dpi). Higher the resolution, better the quality. The number of bits in a pixel is called depth. For example, 1 bit depth is enough for B/W.

Video: Sequence of frames displayed with a given frequency is video. For example HDTV - 60 frames per second.

Audio: A continuous series of air pressure waves is called audio. When these airwaves strike the diaphragm of a microphone produce an electric current that varies with the air pressure waves. The quality and resolution of sound is determined with two factors: the sampling rate, i.e. the number of times per second that the amplitude of the wave is measured, usually expressed in kHz (kilo Hertz) and the bit depth, i.e. the range of numbers used to represent each amplitude measurement expressed in bits.

2.3 Terminology

File formats specify how information is packaged in a file, for storage, transmission or usage. Usually is indicated by file extensions, e.g. .mp3; or indicated by Internet Media Type, eg. text/html.

Bit stream encodings specify how the raw bits containing the digitized AV information are processed and (usually) compressed, and they usually underlie certain file formats, e.g. the linear pulse code modulated (LPCM) waveforms that may be found in WAVE or AIFF files or H.264 video encoding found in Quick Time or MPEG-4 files.

Codec (coder/decoder) is a piece of hardware or software that does the encoding or decoding of audio or video information according to a particular compression scheme..

Wrappers and bundling formats include TIFF, METS and MXF. The term "wrapper" is used by digital content specialists to name a file format that encapsulates its constituent bit-streams and includes also some metadata that describes the file content

Simple Bundling formats, like ZIP, Stuffit, TAR, encapsulate their constituent files, but do not describe the content and relationships that may exist between files.

Self-describing Bundle formats, like METS and MPEG-21, are an advanced version of wrappers containing a bundle of files that may be related to complex digital works, such as a movie with multiple segments and sound tracks in different languages

Recommended Archive Formats (2014): The table below shows a simplified categorisation of different formats as codecs, wrappers for Images, Audio and video files.

Media Type	Digital Containers/ Wrappers	Codecs	Preferred formats for management back-ups and data preservation	Other acceptable formats for data preservation
Digital Image	FITS (Flexible Image Transport System)		TIFF version 6 uncompressed (.tif)	JPEG (.jpeg, .jpg)
Digital Audio	AIFF (Audio Interchange file format) WAV (Audio for windows) XMF (Extensible Music Format)	Free Lossless Audio Codec (FLAC)	Free Lossless Audio Codec (FLAC) (.flac)	TIFF (other versions) (.tif, .tiff)
Digital Video	MP4 (MPEG 4) FLV, F4V (Flash videos) AVI (standard for windows) Quick time file format (.mov, .qt)		Waveform Audio Format (WAV) (.wav)	

Table 1: Recommended Archive Formats

2.4 Issues and challenges for Long Term Digital Preservation

2.4.1. Media Obsolescence
It is expressed through media failure and lack of hardware to access media.
- Media failure: The audio visual data is normally stored on local stores like laptops, optical media, file servers; and central stores like tape backups and central file servers. All these options are not good for long term storage as tapes may be broken or stretched or magnetic signal may degrade; Optical media such as CD/DVD can have physical damage or its surface

can be corroded; Hard drives can fail and if they lose just one bit in an encrypted or compressed file, that can result in the entire file being unreadable.

- Lack of Hardware to Access Media: The removable media such as tapes, CD, DVD require hardware to read them and given the evolution of technology, in few years the hardware readers required may not be available. For example, today is very difficult, if not impossible, to find readers for the "floppy disks" very popular in the nineties. (Tilbury, 2010)

2.4.2. File Format Obsolescence
Even if the physical media is readable, there is the risk that no software is any longer available to interpret the bit stream coming from the media, either because the file format has become obsolete, or because there are no codecs available to decompress the audio visual information. (Tilbury, 2010)

2.4.3 Metadata Issues
Integration of metadata with the digital AV files is an issue. Embedding metadata into AV files including the links and reference to context during preservation is important. But keeping the metadata separate from AV files facilitates the updating of information without modifying the digital object. (Presto4U Paris Report, 2013)

2.4.4 Legal Issues
Barriers related to audio visual rights and copyright clearance always occur in the creation of new digital objects. For example, in the education field, there is sometimes some reluctance by teachers to assign rights for the video recordings of their lessons. This might be associated to the fact that teachers tend to refresh their teaching methods and styles on a regular basis, so they constantly need to assess to what extent the video lectures are current and the context of use. Their preservation for future research use and sharing could bring some difficulties related to IPR issues. (Presto4U Paris Report, 2013)

2.5 Overview of Presto4U Project

Presto4U (Presto4U, 2013) is a two-years Project initiated on 1st Jan 2013 to be completed by 31st Dec 2014, supported by a network of 14 PrestoCentre members and funded by European Commission's Seventh Framework Programme (FP7). Presto4U mainly identifies and evaluates technologies and tools and promote their adoption by memory organizations and by technology and service providers.

The Presto4U logo represents a triple helix, better known as triple- standard DNA, addressing stakeholder groups for digital audio-visual preservation:
- AV media archives
- Researcher
- Industrial players
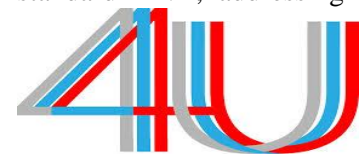
Figure 1: Presto4U Logo

Presto4U aim is to identify useful results of research in the field of digital audio-visual preservation and to raise awareness and improve the adoption of these results both by technology and service providers as well as media owners. Its objectives involve the delivery of new tools and services to connect the different constituencies involved in AV media preservation: expert users, who understand the problems and require technological solutions; researchers who can develop the fundamental knowledge; and technology providers who can commercialize research results as sustainable tools and services. The methods it uses to find out needs are online and offline interactive discussions through Skype conference call, workshops, webinars and surveys. As output, a feedback mechanism will be developed, by establishing a research technology watch and assessment of research outputs in the field of preservation (Presto4U, 2013). In addition, Presto4U will establish a database of AV needs and of the technologies available for their preservation, together with software that will provide

technological solution by suggesting appropriate tool or technology for any specific preservation need.

The project has nine different communities of practices who share the similar audio visual preservation needs and preservation tool requirements. The nine communities of practice are as follows:

- Music and Sound Archives
- TV, Radio and New Media Broadcasting
- Video Production and Post-Production
- Film Collections and Filmmakers
- Video Art, Art Museums and Galleries
- Footage Sales Libraries
- Research and Scientific Collections
- Learning and Teaching Repositories
- Personal Audio-visual Collections

The project Presto4U wants to explore these Communities of Practice in order to find out the following: (Presto4U Knowledge Schema Report, 2013, p.13)

- how the CoP uses digital media: the purpose (end) and the business (means);
- status quo: what technology it uses;
- status quo: what problems it experiences;
- technology change: what emerging technology and services are relevant;
- business change: what the CoP hopes to achieve with digital media; and
- business change: barriers to the adoption of new technology.

2.6.1 Overview of Communities of Practice under Study

For the purpose of this thesis, mostly for practical reasons, three Communities of Practice have been taken into consideration, namely Research and Scientific Collections (RSC), Learning and Teaching Repositories and Video Production and Post-Production. All three communities provide many examples of collections of AV material, making the results of the Presto4U project interesting for an audience much wider than the actual Presto4U members.

Research and Scientific Collections

Research institutes, universities, scientific labs, industries and particularly every place where research on audio-visuals takes place are part of the RSC community. The audio visual content is produced during the research carried out by the community itself. Community is much interested in the creation of content in various forms including audio-visuals, but AV preservation is hardly part of its mission. This is the only community that needs much literature preserved in libraries and archives in print and digital form for their research. As the name suggests, the community contains many collections related to scientific data and research data, like NASA space research material, sound and video from JISC, or independent radio news archives, music libraries and national sound archives from the UK. The main purpose of this community is to preserve media collections produced by research and collections particularly created to support research, for example the TRECVID database.

Learning and Teaching Repositories

This community is made of higher education institutions like universities, colleges and other technical education institutions, which make, collect, document and re-use video content. The community record their class lectures or presentations as videos, and use technologies like animation, video microscopes, video telescopes and presentations. At the same time it experiences problems regarding capturing the original quality, documenting the video for user access, dividing the content into semantically useful segments, providing semantic access to segments. Some examples of this community are MIT open courseware and Stanford University YouTube Channels.

Video Production and Post-Production

The community is made by companies that are involved in capturing the raw content and processing into final content. This community act on instructions issued by broadcasting, independent film makers, programme originators and advertising sectors. For this community film is virtually obsolete, video tape is becoming obsolete, and file based production and use of Internet is becoming the solution of choice. But for production video it experiences problems like lack of standardisation, interoperability and high connectivity costs. To solve these issues there are requirements for common standards for delivery from broadcasters, for agreed best practice workflows and for pricing models from vendors and service providers that cater for project based budgeting rather than capital investment.

2.7 UML (Unified Modeling Language)

One of the tools developed by Presto4U to achieve its objectives is a Knowledge Schema to model the preservation needs of the CoPs, defined in the Unified Modelling Language (UML). The Object Management Group (OMG) released the Unified Modeling Language (UML) in 1997. UML helps to specify, visualize, and document models of software systems including their structure and design. It gives the flexibility to model any type of application running on any type and combination of hardware, operating system, programing language and network. UML 2.0 (the present version) defines thirteen types of diagrams, divided into three categories:
Structure Diagrams: that includes the Class Diagram, Object Diagram, Component Diagram, Composite Structure Diagram, Package Diagram, and Deployment Diagram.
Behaviour Diagrams: that includes the Use Case Diagram (used by some methodologies during requirements gathering); Activity Diagram, and State Machine Diagram.
Interaction Diagrams: that includes the Sequence Diagram, Communication Diagram, Timing Diagram, and Interaction Overview Diagram. (UML, 2014).

The Presto4U knowledge schema uses the Class Diagram to represent its model. In Class Diagram, (UML Class Diagram, 2014) various classes are created and each class can be associated with any other. These associations represent static relationships between classes and are represented with lines, with association names and roles, i.e. the way in which two classes see each other. The symbols at the end of the connection indicate the number of instances of one class linked to one instance of the other class. For example, one company will have one or more employees, but each employee works for one company only.
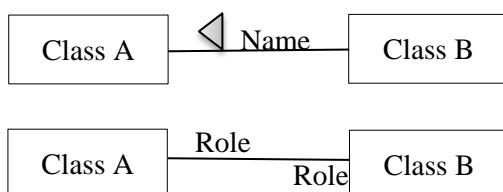
Figure 2: Class Associations

Indicator	Meaning
0..1	Zero or one
1	One
0..*	Zero or many
*	Many
1..*	One or many

Table 2: Class Association Indicators
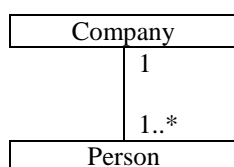
Figure 3: Representation of Association in two classes

2.8 Presto4U Knowledge Schema

Presto4U has defined a knowledge schema called 'Presto4U Communities of Practice Knowledge Schema' to describe the AV preservation needs and their matching tools. It is described in UML, and comprises seven classes.
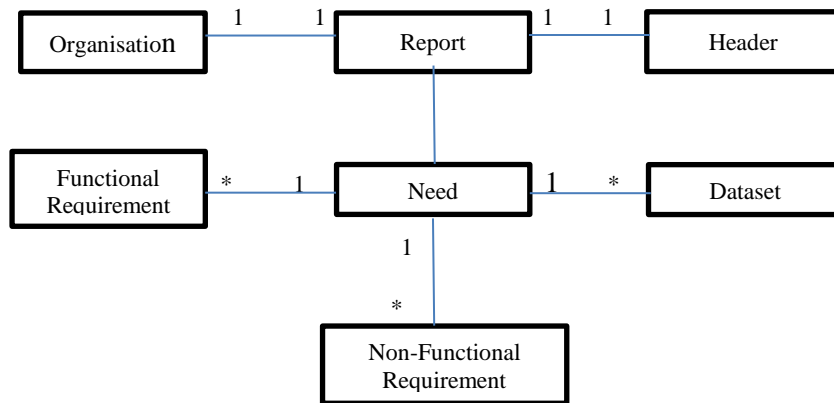

Figure 4: UML Representation of Preto4U Knowledge Schema

Class Report has one to one association with classes' organisation and header. In other words, the Report is the main entity of interest, and it includes information about the Organization associated with the Report, and one Header describing the context in which the Report was generated. The Report may contain a number of Needs, which can be either Functional or Non-functional, with each Need connected to one or more Dataset, i.e. a collection of AV material with homogeneous characteristics. Here is a more detailed description of the classes.

Report class is container of knowledge produced during Presto4U project. The knowledge about AV preservation needs is collected during an event (survey, workshops, conference, and webinars) from a Community of Practice (CoP) member by using knowledge schema as a template.

Header class provides details of CoP members, events, and communication regarding all events. Organisation class expresses the CoP member features by properties which include the CoP member organisation's mission; position publically and economically, its usage of media and usage of technology.

Need class deals with preservation need of a CoP member organisation. The whole need is expressed by properties that are based on currently used technology, reasons for dissatisfaction, involved datasets, desired technology, barriers and requirements.

Dataset describes the particular object or collection to which a need applies. It is expressed through properties. For example, compression, format, frameSize and so on. These properties are based on the Multimedia Ontology recommended by the World Wide Web Committee.

Functional requirement describes the need in functional terms. It is related to what (which function) the system should do. It deals with description of use case, providing explanation of particular need's complete cycle, pre-condition, post conditions, special requirements and use. For example need to compress the file.

Non-functional requirement describes the need in non-functional terms. It is concerned with how the system should implement the function, describing qualities of the functionality. For example, effectiveness, flexibility, capacity and so on (Meghini, 2013).

Conceptual Map of Knowledge Schema: The CoP knowledge schema can be represented also through a concept map, as in Fig, 5, which shows also all the attributes of the classes.
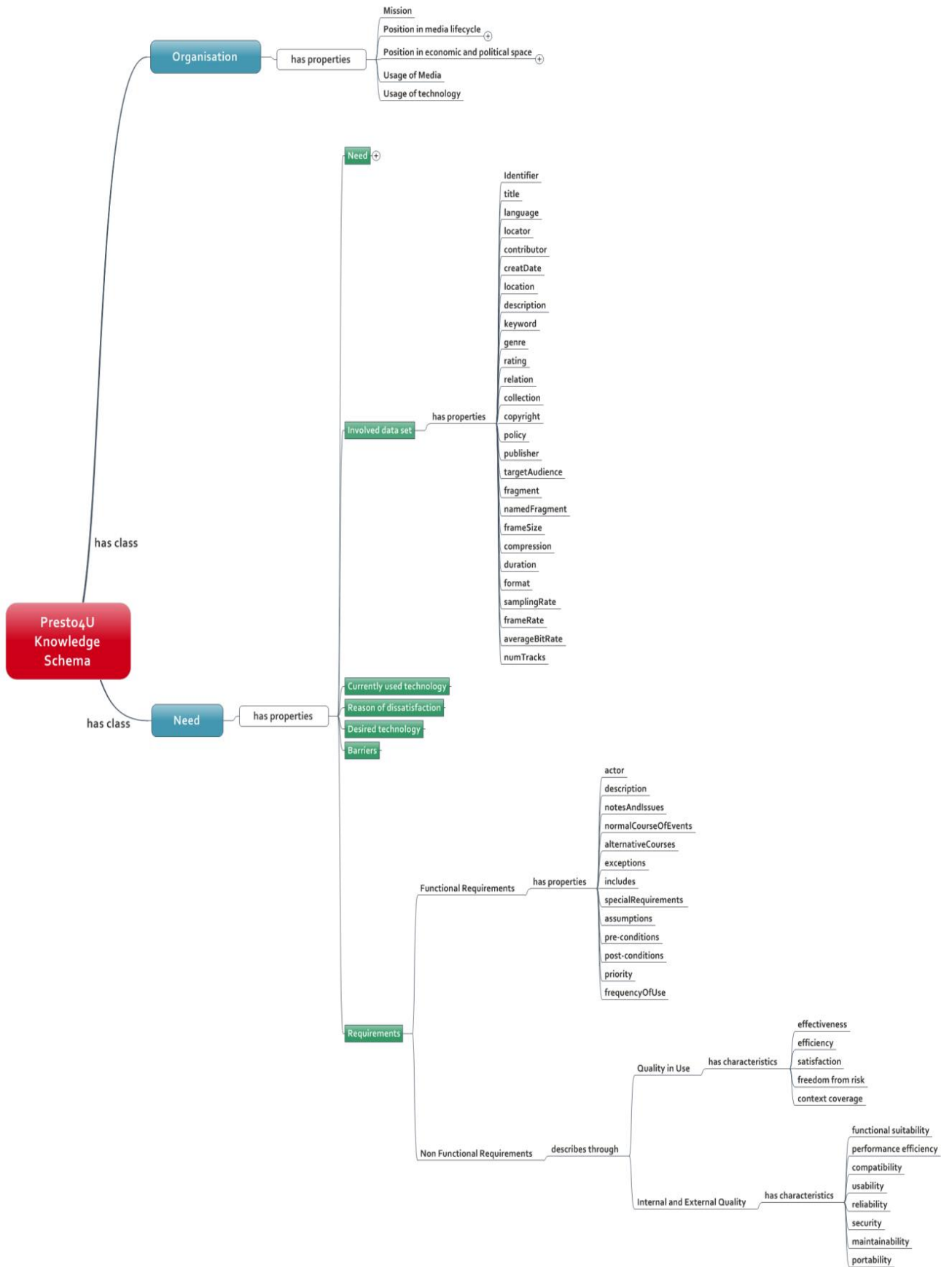
Figure 5: Conceptual Map of Presto4U CoP Knowledge Schema

2.9 Theoretical Framework

The Open Archival Information System (OAIS) reference model has been taken as the theoretical and conceptual model for this study. OAIS is very effective as theoretical framework as it provides the concepts needed by non-archival organizations to be effective participants in the preservation process (Reference model OAIS, 2002). It has been widely accepted as a key standard reference model for long term archival systems.

The SHAMAN project was dedicated to the development of the next generation digital preservation framework keeping OAIS reference model as base for its architecture (SHAMAN, 2008). The architecture of the HOPPLA archiving system is influenced by OAIS reference model, particularly for data storage, auditing and certification (HOPPLA 2010). The preservation planning of the Plato planning tool (Plato, 2007) was developed as part of the PLANETS project and based on OAIS preservation planning (PLANETS 2007). The Cyclops tool allows archive producers to describe the life cycle of an artistic work, and has based his representation information, context and provenance on key concepts of the OAIS standard (Cyclops 2014). The CASPAR project has built its framework for modelling the end-to end preservation life cycle for digital information based on the OAIS reference model, using the OAIS defined concepts, terminology and framework (CASPAR, 2014). The EDCINE project, which has developed methods and formats for long term preservation of digital films, has based its concept on the asset store approach of OAIS reference model.

Literature review reveals that ARPASEN (Alliance for permanent access to scientific information) (2014) is leader in Europe to develop a shared vision and framework for a sustainable organisational infrastructure for permanent access to scientific information. There are various projects concerned about different aspects of long term preservation. Allinson (2006) through his study evaluated the adequacy of the OAIS Reference Model to use it across the variety of repositories being developed within the JISC community. It explained long term preservation, OAIS concepts, and tried to evaluate it class wise, this model evaluation has been referred to complete the current study.

2.9.1 The OAIS Reference Model

The OAIS is briefly explained through its environment. OAIS environment consists of Management, Producer and Consumers. Management formulates, revise and enforce the policy framework governing OAIS activities but is not responsible for managing the day to day operations of OAIS. Producers are individuals, organisations or systems who submit information to the OAIS archive for long term preservation. Consumers (designated community) are individuals, organisations or systems that use OAIS preserved information. (Lavoie, 2010)
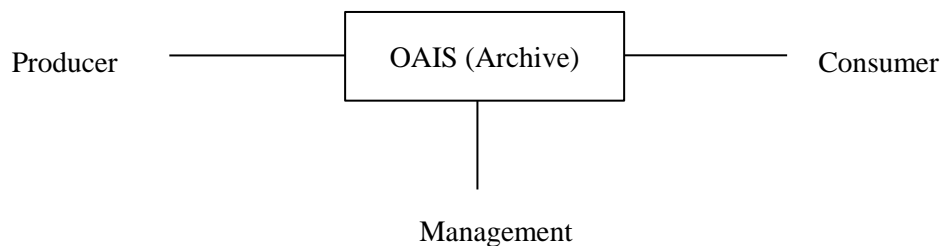

Figure 6: OAIS Environment

An example of such OAIS environment is the National Digital Archive of Datasets (NDAD), a UK based initiative that preserve computer datasets produced by UK government departments. So OAIS is National data repository (NDR) service. The management role is done by UK National Archives which provides legal policies, funding and selection of datasets. The producers are UK government departments and agencies. Consumers are general public.

An OAIS archive must support six main functions.
Ingest: It accepts information submitted by producers in a suitable format (SIP, Submission Information Package) and makes them ready for archival storage. Ingest receives information from the producer, validates the received information by checking that it is uncorrupted and complete,

transform the received information into suitable form for storage (AIP, Archival Information Package), creates some descriptive metadata and finally transfer the information to the archival storage.

Archival Storage: It ensures that the archived information resides in the appropriate type of storage. It undertakes format migration, implement safeguard mechanisms such as error checking and disaster recovery, and retrieves information to support access requested by consumers.

Data Management: It maintains databases of descriptive metadata, and also administrative data to support OAIS internal operations, like system performance or access statistics. It also generates reports on request, and updates the databases if information is modified or deleted.

Access: It manages the processes and services through which consumers locate, request and receive items from the OAIS archival storage. It processes consumer queries by forwarding request to data management, coordinating the retrieval of information from archival storage and delivers it to the consumer, in a suitable format (DIP, Dissemination Information Package).

Preservation Planning: It prepares strategy keeping in mind the user, innovations in storage and access technologies that are external to the OAIS environment. It recommends updating of the OAIS policies and procedures to remain current with changes.

Administration: It manages the daily routine operations of the OAIS. It interacts with producers for negotiating submission agreement, with consumers for providing customer service support and with management by implementing and maintaining archive policies and standards (Lavoie, 2010).
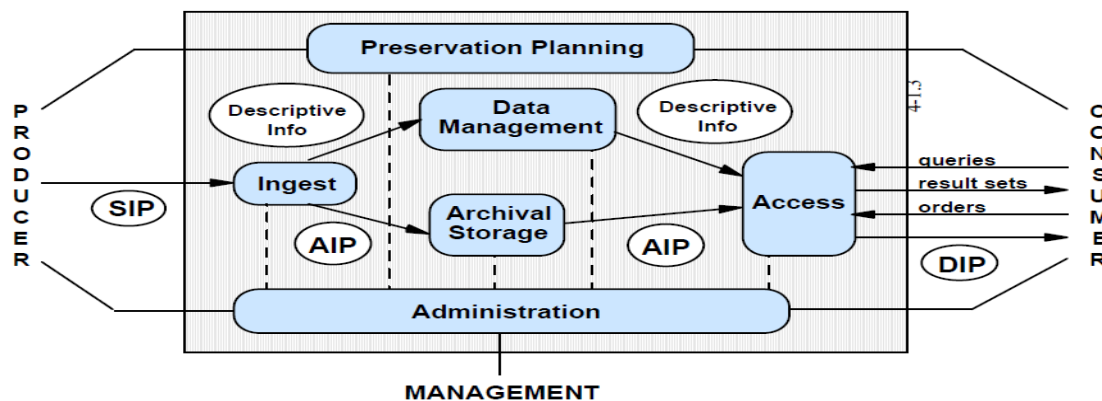

Figure 7: OAIS Functional Model

2.10 Projects and Initiatives Related to Preservation Tools

Some of the other international projects exploring development of registries for technical information to support digital preservation are discussed below:

PRONOM

It is an online information system about data file formats and their supporting software products. These software's support digital preservation functions such as preservation risk assessment, migration pathway planning, object identification & validation and metadata extraction. Actually, it is developed to support the accession and long term preservation of electronic records at National Archives, UK.

DROID

One software tool created under PRONOM technical registry service is DROID (Digital Record Object Identification) that performs automated batch identification of file formats. It is platform-independent Java tool that is available free to download as open source.

JHOVE

It is open source java tool developed by JSTOR and Harvard University to allow the automatic identification, validation and characterisation of a range of digital object types. The use cases of JHOVE are:

1. Identification
    a. "I have an object; what format is it?"
2. Validation
    a. "I have an object that purports to of format *F*; is it?"
    b. "I have an object of format *F*; does it meet profile *P* of *F*?"
    c. "I have an object of format *F* and external metadata about *F* in schema *S*; are they consistent?"
3. Characterization
    a. "I have an object of format *F*; what are its salient properties (given in schema *S*)?"

In OAIS reference model it covers Submission Information Package (SIP) creation and ingest validation functions.

COPTR

Community Owned digital Preservation Tool Registry (COPTR) describes tools useful for preserving digital information for the long term. It helps users find preservation tools that meet their long term digital preservation need. It ensures sharing knowledge about existing tools and their effectiveness instead of creating new tools. It is build up by Open Planets foundation. The other partners are - The Digital Curation Centre (DCC); The Digital Curation Exchange (DCE); National Digital Stewardship Alliance (NDSA); The Open Planets Foundation (OPF); Preserving digital Objects With Restricted Resources project (POWRR).

PANIC (Preservation webservices Architecture for Newmedia, Interactive Collections and Scientific Data)

Distributed systems technology centre of University of Queensland is working on this project. PANIC project aims to develop a semi-automatic preservation service for scientific data for monitoring of archival collections, support decision making about preservation actions, and then invoke appropriate preservation service (for example format conversion service) using semantic web and web services. The different use cases it is dealing with are:

- Compare emulation, migration and metadata approaches to multimedia preservation;
- Determine the optimum media formats, authoring tools, metadata & preservation processes to maximize longevity, accessibility and preservation of multimedia objects;
- Develop recommendations and guidelines for multimedia content creators and collecting agencies;
- Implement metadata schemas, metadata capture tools, workflows for capturing essential metadata and automating preservation actions; (PANIC Objectives, 2014)

Under this project it also created PREMINT (PREservation Metadata INput Tool) designed to collect information regarding a digital object. (PANIC Premint, 2014)

National Library of New Zealand Metadata Extractor

An open source java based tool that extracts preservation metadata from digital objects file formats like PDF documents, image files, and sound files Microsoft office documents and save them in XML format is developed by National library of New Zealand. It supports these multimedia file formats:

- Images: BMP, GIF, JPEG and TIFF.
- Audio and Video: WAV, MP3 (normal and with ID3Tags), BFW, FLAC.
- Markup languages: HTML and XML.
- Internet files: ARC

(Metadata Extraction Tool, 2014)

Digital Curation Centre
This centre is doing research on the issues of storing, managing, preserving data for long term and particularly issue of file format registry.

KEEP Project
It is EU funded project aimed to enable automation of emulation that is means of overcoming technical obsolescence of hardware and software by developing techniques for imitating obsolete systems on future generations of computers (Beagrie, 2001). (by rendering an obsolete object in the appropriate environment).

Planets Project
This project enabled the automation of migration tools through the planning tool Plato that is a web-based decision support tool that implements a solid preservation planning process and integrates services for content characterisation, preservation action and automatic object comparison in a service-oriented architecture to provide maximum support for preservation planning endeavours. (Planets Planning Tool, 2008, P. 4)

Digital Formats for Library of Congress Collections
The website of library of congress collects technical information about file formats related to digital collection of library that supports to take preservation decisions. It also provides details of factors that affect the sustainability of formats over long term. A full list with description of all formats under categories like Image, Video, Sound, Text, Web Archive, Geospatial, Generic and Dataset is provided. (Digital Formats for Library of Congress Collections, 2014)
All the tools of Audio and Video described by Library of Congress are given below:
List of Audio Tools
- Audio/Video to WAV Converter
- BWF MetaEdit
- CDRDAO: Disk-At-Once Recording of Audio and Data CD-Rs/CD-RWs
- DBpoweramp Music Converter (dMC)
- Easy CD-DA Extractor
- ExifTool
- FFmpeg
- GetID3()
- IsoBuster
- Mdqc
- MediaInfo
- MPG321
- Paranoia
- Rescarta
- Template:Tool/Preload
- XcorrSound
- XMP metadata support in JabRef

List of Video Tools
- Audio/Video to WAV Converter
- DV Analyzer
- ExifTool
- FFmpeg
- GetID3()
- IsoBuster
- Mdqc
- MediaInfo
- NARA Video Frame Analyzer
- Open Video Converter
- Paranoia

- o   Qctools
- o   TubeKit

(Digital Formats for Library of Congress Collections, 2014)

Schuller (2008) through TAPE report discussed the technical challenges of AV preservation; awareness of such challenges by collection holder; possible strategic measures to solve the preservation problems; and specific obstacles to organise and finance preservation.

National Digital Stewardship Alliance (NDSA, 2014) explains organizational roles, policies, and practices. It highlights the moving image, recorded sound and preservation technical infrastructure development issues. Digitizing video for long-term preservation: an RFP guide (Stefano, 2013) and template provides basics of videos and metadata related issues. It helped to understand such issues occur during evaluation.

2.11 Chapter Summary

By going through the whole chapter it is understood that the review of literature showed lot of projects on preservation talked about audio-visuals basics, tools, formats, storage, and access. Most of the projects dealing with preservation has opted OAIS reference model as their theoretical framework because it provides complete guide on how to preserve a digital document for long term. There are number of projects which has made and are still making tools to solve various preservation issues to summarise - DROID (Digital Record Object Identification) that performed automated batch identification of file formats; JHOVE provided automatic identification, validation and characterisation of a range of digital object types; COPTER ensures sharing knowledge about existing tools and their effectiveness instead of creating new tools; PANIC project aimed to develop a semi-automatic preservation service for scientific data for monitoring of archival collections, support decision making about preservation actions, and then invoke appropriate preservation service; KEEP aimed to enable automation of emulation (by rendering an obsolete object in the appropriate environment); and Planning tool Plato which enabled the automation of migration tools. Presto4U project now aimed to enable semi-automatic matching of preservation tools with audio-visual needs. To express the audio-visual needs formally it has mapped a knowledge schema using unified modeling language that has been evaluated through this study. As discussed in the chapter knowledge schema has seven classes namely Header, Report, Organisation, Need, dataset, functional requirement and non-functional requirement.

Chapter 3

3.1 Introduction to Chapter

The chapter introduces the research design of the whole study. It is dedicated to explain the research process that includes the research approach taken, different type of research methods used, research instruments used, limitations occurred during the research and the strategy to carry out the field study. The profiles of the three Communities of Practice (CoPs) in the scope of this study are briefly summarized. They are Research and Scientific Collections, Video Production and Post Production, Learning and Teaching Repositories. The research methods used are validated and well supported by the available literature.

3.2 Introduction

Conducting research is like a journey with one destination and long way to reach there. As we plan our journey by considering type of vehicle to take, schedule and cost; in the same way, research is conducted by applying methods, procedures and models.

The research done for this thesis is an evaluative study with qualitative research approach conducted through interview and structured questionnaire to access the AV preservation needs of three Community of Practices, as listed above. In the study, a questionnaire available on the Presto4U website was used, together with interviews. The interviews to members of RSC, VP&PP, and L&TR CoPs were conducted at their workplace or, where this was not possible, by Skype, to help them fill the questionnaire and also to get more information on AV preservation needs. The questionnaire and the interview were containing questions related to AV preservation needs, technology, organisational assets and desired tools. Since the main aim of the study was to judge the adequacy of the knowledge schema for its ability to access and represent the AV preservation needs, the study has focused on the analysis of the results of the questionnaire and interviews.

3.3 Main Objective and Research Questions

As stated before, the main objective of the thesis is to evaluate the adequacy of the Presto4U knowledge schema to represent the preservation needs of digital audio-visual applications for different Communities of Practice. More precisely, the research questions can be articulated as follows:

- Is the knowledge schema of presto4U able to represent the needs of communities of practice?
- Is there requirement of any new class in the knowledge schema?
- Are the properties of Need concept able to represent the requirements of AV communities?

3.4 Scope of Study

The study has been undertaken in three different Communities of Practice:
- Learning and Teaching Repositories (L&TR)
- Video Production and Post Production (VP&PP)
- Research and Scientific Collections (RSC)

The Learning and Teaching Repositories CoP in Presto4U has the following seven members:
- The Open University, Milton Keynes, United Kingdom
- Iuav University of Venice, Venice - Italy
- Digital Repository of Ireland at the Royal Irish Academy, Dublin, Ireland
- University College Dublin, Dublin, Ireland
- University of Rome Sapienza, Rome
- Screen Archive South East, Chichester, England
- University Innsbruck, Innsbruck/Austria

The Video Production and Post Production CoP in Presto4U has the following six members:
- Parallel40, Barcelona, Spain

- VET Post Production and Training, London UK
- Library and Sales department, CCMA- Televisió de Catalunya, Barcelona, Spain
- Documentation, RTL Nederland, Hilversum, Holland
- Infostrada Creative Technology, CMI holding, Hilversum, Holland
- ENEX, Luxembourg

The Research and Scientific Collections CoP in Presto4U has the following eight members:
- Scuola Normale Superiore, Pisa, Italy
- University of Siena, Italy
- University of Hertfordshire, UK
- W3C, ERCIM, France
- INRIA Paris, France
- Technical University of Delft, Netherlands
- University of Geneva, Switzerland
- INRIA Lions, ERCIM, France

This section provides brief description on the background, mission, and area of research of all the members of the three CoPs considered for the study. Their profiles have been given below. Out of them only fourteen members were able to contribute to the questionnaire and the interviews.

3.4.1 Research and Scientific Collections Community of Practice

Scuola Normale Superiore, Pisa
It is located in Pisa, Italy and is known for its academic excellence since Napoleonic period in Tuscany. It has analogue and digitized audio recordings that contain literature related to oral history, related to both the Second World War, and linguistic aspects in Tuscany. The archive of audio recordings covers literature about Tuscany, in the form of interviews, folk songs, cultural and traditional music, and stories. The total size of the collection is about 2800 hours of audio (corresponding to four terabits of data). The Scuola Normale has the mission to preserve and share its AV collections after fully digitizing them. The Archive is maintained under a funded project called Gra.Fo. (Scoula Normale Superiore, 2014)

University of Geneva
It was founded in 1559 by Jean Calvin. Now it is the second largest university in Switzerland with 16,000 students from 140 different nationalities providing 280 types of degrees in sciences, medicine and humanities. For our interests, it has a working group called 'Viper: Multimedia Information Retrieval', whose area of research is in the processing and management of multimedia. In particular, it focuses on multimedia information retrieval and mining. Its current research interests span from content-based video indexing to automated multimedia description (Viper, University of Geneva, 2014).

University of Hertfordshire, UK
The Digital Media Processing & Biometrics Group is part of the Centre for Engineering and Applied Science Research (CEASR), conducting its activities within the Science and Technology Research Institute (STRI) and is located at Hatfield, UK. The research activities performed go from speech enhancement and voice biometrics to 3D imaging and hardware for image processing systems (Univ. of Hertfordshire, 2014).

University of Siena
The Department of Education, Human Sciences and Intercultural Communication deals with research on linguistics and is located in Siena, Italy. (University of Siena, 2014)

W3C/ERCIM
ERCIM, the European Research Consortium for Informatics and Mathematics is one of the organizations that host W3C activities. The area of research of interest for this study is the W3C Mobile Web Initiative, which addresses issues of interoperability and usability for the mobile Web through a concerted effort of key players in the mobile production chain, including authoring tool vendors, content providers, handset manufacturers, browser vendors and mobile operators. (Mobile Web Initiative, 2014)

Technical University of Delft, Netherlands
Multimedia Computing Group is part of Technical University of Delft. Its mission is to identify the best possibilities for combining multimedia information retrieval tools (such as multimedia content analysis, multimedia search re-ranking, query expansion and query performance prediction) with social indexing concepts (such as tagging, explicit and implicit collaborative rating and information propagation in social media networks), in a user-centred fashion, to optimize access to multimedia content for each individual user. (Multimedia Computing Group, 2014)

INRIA Paris
The Clime research group at INRIA in Paris is conducting research in the area of environmental forecasting, with emphasis on data and models coupling in the areas of inverse modelling and image assimilation (INRIA - Clime, 2014).

INRIA Lions and ERCIM Paris
The ERCIM Working Group "IM2IM" is participating in a joint initiative with SCAI (Institute for Algorithms and Scientific Computing) of Fraunhofer Gesellschaft and with project BANG/REO of INRIA, Paris. The main topics of research are mostly in Medicine, especially in computer-aided minimally invasive procedures in medicine and surgery. As part of that, image processing, computer graphics, virtual reality, modelling and simulation of the behaviour of biological tissues and robotics are all involved (ERCIM Working Group "IM2IM", 2003).

3.4.2 Video Production and Post Production Community of Practice

Parallel40 Barcelona, Spain
Parallel40 is an international audiovisual production and management company, started on 1996 and based in Barcelona. It provides services in areas like production, exhibition, distribution and training. Parallel40 is also member of the Association of Producers Documentary (PRO-DOCS) and the European Documentary Network (EDN). Its Mission is to contribute to the cultural enrichment of society through broadcasting. (Parallel40 Barcelona, 2014)

VET Post Production and Training, London UK
The VET (Video Engineering & Training) cooperative was set up in 1985 with the mission to make video technology accessible for everyone. It provides practical training and courses in creative craft and technology for TV film and video. (VET Post Production and Training, 2014)

Library and Sales department, CCMA- Televisió de Catalunya, Barcelona, Spain
The public Catalan Broadcasting Corporation (Corporació Catalana de Mitjans Audiovisuals, CCMA), which includes television, radio and internet media was founded on 1983. (Library and Sales department, CCMA, 2014)

Documentation, RTL Nederland, Hilversum, Holland
RTL group is the leading European entertainment network with 56 TV channels, 27 radio stations, in 12 countries and a world-wide production. RTL Group is able to deliver its content to all media platforms worldwide and to repeat its broadcasting success story in every country while fulfilling its obligation to society (Documentation, RTL Nederland, 2014).

Infostrada Creative Technology, CMI holding, Hilversum, Holland
CMI develops technology for the creation, management, storage, distribution and monetization of digital media and provide this technology to broadcasters, media companies and rights owners as a fully customizable managed service or through the product portfolio (Infostrada Creative Technology, 2014).

ENEX, Luxembourg
ENEX is an association of the world's leading commercial TV broadcasters. ENEX members share their news content and their news production resources. ENEX holds permanent satellite capacity for use by members. ENEX members contribute more than 25.000 news video items per year. (ENEX, 2014)

3.4.3 Learning and Teaching Repositories Community of Practice

The Open University, Milton Keynes, United Kingdom
It is an Open University that provides access to a world class collection of high quality and trusted online resources to students and staff via library. The library has moving and still image collections, music collections, and sound collections. (The Open University, 2014)

Iuav University of Venice, Venice - Italy
The Architecture School of the University of Venice was established in 1926 and is totally focused on design. It is a dedicated place for teaching and for specializing in the design of living spaces, of environments such as buildings, cities, landscapes, regions, and in the design of every-day use objects. The video library has a significant collection of audio visual material on architecture and planning and in the design of arts and theatre (approximately 2,400 videos made in Italy and abroad). It also conserves video recordings of conferences, seminars and lessons that have been held at the university since the 1980s. (Iuav University of Venice, 2014)

Digital Repository of Ireland at the Royal Irish Academy, Dublin, Ireland
The Digital Repository of Ireland (DRI), launched in 2011, is an interactive, trusted digital repository for social and cultural content held by Irish institutions. The DRI is also acting as a focal point for digital best practices by collaborating on the development of guidelines, and working to inform national policy making bodies about digital preservation and access. The DRI is a consortium of leading institutions, such as the Royal Irish Academy (the lead partner), the National University of Ireland at Maynooth (NUIM), Trinity College Dublin (TCD), Dublin Institute of Technology (DIT), the National University of Ireland at Galway (NUIG), the National College of Art and Design (NCAD) (Digital Repository of Ireland at the Royal Irish Academy, 2014).

University College Dublin, Dublin, Ireland
The Media Services at the University College in Dublin is a public institution with the mission to support a high quality educational experience and to engage in research-led teaching and learning. It has about 10,000 hour of video collections (University College Dublin, 2014).

University of Rome La Sapienza, Rome
The Digilab of the University of Rome La Sapienza is public institution has the mission to develop e-learning materials for university departments (focussing on digital humanities). It has collection of about 1000 hour videos. (University of Rome Sapienza, 2014)

Screen Archive South East, Chichester, England
Screen Archive South East was established in 1992 at the University of Brighton as the South East Film & Video Archive. It is a public institution maintaining an archive of "moving images", serving the South East of England. The main function of this regional movie archive is to locate, collect, preserve, provide access to and promote film material related to the South East and of general

relevance to movie history. It has about 10,000 hours of audio, video and film collections (Screen Archive South East, 2014).

University Innsbruck, Innsbruck/Austria
The University of Innsbruck was founded in 1669 and is one of Austria's oldest universities. In its mission there is the collection of AV material to support research and education. It has about 10,000 hours of audio and video collection (University Innsbruck, 2014).

3.5 Overview of Research Process
The research process has involved several steps to carry out the study. These steps are as follows:
- Selection of topic
- Literature review for selection of theoretical framework
- Selection of research methodology/design
- Data collection
- Data Analysis
- Findings & Conclusion

The first two points were discussed earlier in this chapter as well as in second chapter. The other points are discussed in detail here below.

Research Methodology/Design
- Research Approach   - Qualitative Research Approach
- Research Method   - Evaluation Method
- Research Techniques - Interview and Questionnaire (Data collection techniques)
- Research Instruments - Human and Computer
- Theoretical framework - Open Archival Information System Reference Model

Research Approach
Qualitative research approach is being used in the current study because the data collected cannot be measured quantitatively, as the preservation needs were provided (and analysed) qualitatively. Qualitative design considers social construction of reality (Gorman and Clayton as cited in Pickard, 2007) and the essential components of a qualitative research design are "literature review, theoretical framework, fieldwork in a natural setting, using a human instrument, appropriate data collection techniques, inductive analysis, emergent design, iteration of activities, grounded theory, negotiated outcomes" (Pickard, 2007).

Research Method
The study uses an evaluation method that involves evaluation of adequacy of knowledge schema to formally represent the preservation needs for AV material, in the frame of the Presto4U project. In practice, evaluation is a systematic determination of a subject's merit, worth and significance, using criteria governed by a set of standards.

Research Techniques
Two different techniques were used, namely Interview and Questionnaire, as data collection techniques.

Interview
It was decided to select the Interview method to collect the data because the technical terms of the knowledge schema were difficult to understand by the different community members while filling up a questionnaire. The interview material consisting of Introduction to Interview, Introductory mail to CoP members, Consent form and Thanking mail to members is provided as Appendix A.

Interview Procedure
Several steps were taken to carry out the interview activity.
- Introductory mail sent to CoP members

- Interview scheduled using Doodle software with CoP members
- Consent form signed digitally by CoP members
- Mail with 'link to questionnaire to be filled' to CoP members
- Interviews conducted face to face or via Skype
- Thanking mail sent to participating members.

Interview Guide

It was advisable to have guide which could be followed during the interview. Due to the nature of study the minimum time set for an interview was one hour and the maximum was three hours. All the questions were open ended to get more and more data from the members. The main purpose of the interviews was to understand the organisation and its audio-visuals related needs. The interview guide contained two important parts:

- Interview with Director/Manager to understand Organisation, policies on AV preservation and basic preservation needs.
- Interview with Technician to know the technical needs of AV preservation.

Interviews were started with an introduction to AV preservation made by the interviewers, followed by CoP members talking about their organisation and expressing their preservation needs. Finally the official questionnaire of Presto4U was filled out. The main questions asked to members were:

- Q. 1 tell us about your audio-visual collections and its preservation?
- Q. 2 what is your audio-visual preservation needs?
- Q. 3 are you aware of the latest preservation technologies for audio-visuals?
- Q. 4 what barriers restricts you to preserve audio-visuals effectively?

Way of Conducting Interview

The CoP members to be interviewed were situated in fourteen different organisations in nine different countries throughout the Europe, so only the one located in Pisa (Scuola Normale) was interviewed face to face, while the others were interviewed via Skype. Interviews were also recorded for further analysis.

Questionnaire

One questionnaire, originally developed in the frame of the Presto4U project was used for the study. Since it was targeted to end users to ask them their preservation needs in simple manner, it did not completely reflect the knowledge schema. It was (it is) available online and was sent via e-mail as a link. The copy of the questionnaire is available in 'Appendix B'.

Another questionnaire better reflecting the whole knowledge schema and able to get preservation needs of community members more easily is under preparation in the Presto4U project, as a joint effort between a researcher of ISTI-CNR and the author of this thesis. It will make data analysis simpler and will further contribute to semi-automatic matching of tools with audio visual applications.

Research Instruments
Human

The main instrument of the study was human, which includes a researcher from ISTI-CNR, the author if this thesis, and the respondents (communities of practice members) who expressed their preservation needs.

Computer

Computer was used as another important research instrument in this study. The main software packages used in carrying out the study were:

- o MS Excel - Microsoft Excel has been used to present the data during analysis. It was selected because it is very easy to use and can represent the knowledge schema related data with flexibility and options to edit, share and export as pdf file. Converting Excel data to Microsoft word can be difficult.

- o Concept Map Software
    - o Mindjet MindMapping. To represent various concepts with a concept map the Mindjet MindMapping software was used (selecting the option of one month as trial package) to represent all necessary concepts such as knowledge schema and its different classes separately.
    - o CMap Tool. At the expiration of the trial period, open source software was chosen. The CMap tool was downloaded, which is easy to use and can be used anytime anywhere. It was used to prepared the graph of the 'Need' class.
- o Recording Software (Skype Call Recorder) - It was the call recorder used during the interviews via Skype. It is open source, easy to use and has a good quality of voice. It was used to listen again to the interviews for a better analysis.
- o Mendeley Citation Software As the software to handle bibliographic references it was used Mendeley, as it is open source, easy to use on the laptop, and interoperable with many applications.

Data Collection
The link to the questionnaire was sent to the 21 members of the three selected CoPs, and interviews were conducted via Skype to help them fill-in the questionnaire and to get more information which was not asked in questionnaire. Out of the 21 members, 14 answered and agreed to participate in the interview.

<div align="center">

Questionnaire
Inherited from Presto4U

Conducted Interviews
To fill above Questionnaire and get more information

</div>
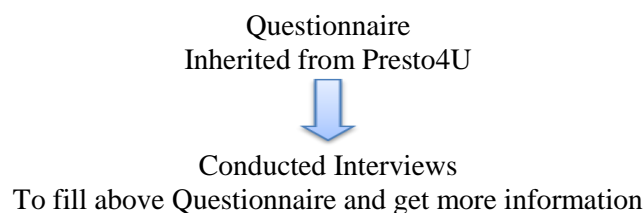
Figure 9: Data Collection

Data Analysis
The data collected using questionnaire and interviews from the 14 CoP members was stored in a database and in MS Excel files. The steps taken to consolidate and summarise the data were:
Stage 0
Matching Questions of Questionnaire with Knowledge schema classes and properties
Stage 1
Matching answers to questions with Knowledge schema classes and properties
Stage 2
Modelling the 'Need' concept through OAIS reference model and Questionnaire
Stage 3
Matching the data in class Need of the Knowledge schema with the 'Need' concept developed at Stage 2
Stage 4
Allocating the consolidated data in all the "Need" related classes of the Knowledge schema (Need, Dataset, Functional requirement, and Non-functional requirement with all properties)
Stage 5
Findings and Conclusion

The full details of analysis are provided in fourth chapter.

3.6 Research Methods Used by Others
There are two examples that show a similar approach to evaluate preservation needs.
PANIC: The strategy took up by PANIC project included a review of current and proposed strategies and existing projects that focus on the preservation of media art. It was followed with the

development of a vocabulary of multimedia terms. Then Interviews with content creators were conducted to get more understanding and collect data on preservation. Then the data was separated into different use cases and a questionnaire was prepared to get more knowledge of preservation issues, like emulation, migration and documentation. The tool PREMINT (PREservation Metadata INput Tool), based on the PREMIS OWL ontology (PANIC Objectives, 2014) and on a questionnaire, was designed, in order to collect information about digital objects and their preservation needs (PANIC Premint, 2014).

Digital Curation Centre (DCC): Digital curation centre developed and used a Data Asset Framework (i.e. a set of methods, interviews and questionnaires) to collect issues related to technology, sharing and overall management in the use and storage of digital assets.. The pilot studies found that a combination of approaches worked best. Questionnaires were found to be the most useful means of collecting basic information from a wide range of stakeholders, while interviews were useful for more detailed, qualitative information on data management and user needs. The table below summarizes their findings (Data Asset Framework, 2009).

Desk-Based Research	
Good to collate background information	Remote access to data may not be granted
Research articles provide details of data creation	Hard to understand local filing / naming systems
Questionnaires	
Good for collecting basic overview	Response rate can be low due to survey fatigue
Allows wide participation	Requires selecting or making software that meet your needs
Interviews	
Provide high quality information	Requires significant input from researchers
Helps to bring out new issues	Can be hard to schedule
	Very time consuming - better if Recorded

Table 3: Research methods used by DCC

3.7 Constraints of Study

Limitations

- The research is limited to finding the needs of AV media preservation for just the three CoPs participating, namely Research and Scientific Collections; Video Production and Post Production; and Learning and Teaching Repositories.
- Not all the Research and Scientific Collection members could be interviewed, as planned initially, due to busy schedule of members who did not have time to participate in the interviews during the three month March to May. On the other hand the study was bound to be completed within a five months period.
- The Questionnaire used to collect data was less effective in collecting the preservation needs than what could be expressed formally in the Knowledge schema. It would have been desirable to use the Knowledge schema tool, which was proposed and designed by the author of this study and a researcher of ISTI-CNR, and which is still under development. When it will be ready it should provide better results for the Presto4U project.

Ethical Considerations
The research topic is based on finding the needs of Audio-visual media used in Research and Scientific Collections; in Video Production and Post Production; and in Learning and Teaching Repositories CoPs, and that involves human resource. The data collected from the respondents through interviews was used only for this study, and the author is aware of all ethical considerations such as confidentiality and privacy of the respondents.

3.8 Chapter Summary

In this chapter we have presented an evaluative study, which involves the evaluation of the adequacy of a knowledge schema to formally represent the audio visual preservation needs (in the frame of the Presto4U project) by using qualitative research approach. Two different techniques are used, namely Interview and Questionnaire as data collection techniques. Interviews to collect data were chosen because of possible difficulties in filling the questionnaire, due to the many technical terms in it. Interviews and questionnaires from all fourteen members of the three Communities of Practice participating in the study were collected. The questionnaire, originally defined in the frame of the Presto4U project, was developed by keeping the OAIS model and Presto4U knowledge schema in mind. From the literature review it was found that the Digital Curation Centre (DCC) had used a "Data Asset Framework" (i.e. a set of methods, interviews and questionnaires) to collect issues related to technology, sharing and overall management in the use and storage of digital assets. The main limitations of this study were the non-complete involvement of all the nine CoPs of the Presto4U project, and the inability to use the knowledge schema to its full extent.

Chapter 4

4. Analysis and Interpretation

4.1 Introduction to Chapter
The chapter introduces the data analysis process and the various steps taken to filter the collected data in order to extract some findings. The chapter presents the process of consolidating the raw data, then summarising it through various steps. Handling the raw data and converting it to meaningful knowledge is stressed in most of the chapter. Steps like matching of questionnaire and knowledge schema format, representing the "Need" in the form of OAIS reference model functional units and consolidating the data into the Knowledge schema format (to check its adequacy) is being covered appropriately.

As anticipated in Chapter 3, the data collected using questionnaire and interviews from the 14 CoP members participating in the study was stored in a database and in MS Excel files. Then, the steps taken to consolidate and summarise the data were:
Stage 0
Matching Questions of Questionnaire with Knowledge schema classes and properties
Stage 1
Matching answers to questions with Knowledge schema classes and properties
Stage 2
Modelling the 'Need' concept through the OAIS reference model
Stage 3
Matching the data in class Need of the Knowledge schema with the 'OAIS Need' concept developed at Stage 2
Stage 4
Allocating the consolidated data in all the "Need" related classes of the Knowledge schema (Need, Dataset, Functional requirement, and Non-functional requirement, with all their properties)
Stage 5
Findings and Conclusion

Note: In the whole chapter attribute and property are used interchangeably when referring to classes.

4.2 Stage 0
Matching Questions of Questionnaire with Knowledge schema
This stage, performed before conducting the interviews, was very important to define a schema able to accept in input the data from the questionnaires and match them with the classes and properties of the Knowledge schema. Since the questionnaire was not having the same structure as the Knowledge schema, there was a need to find out which questions of the questionnaire were fitting into which classes and which properties of the Knowledge schema. After this preliminary step, in Stage 1 the actual matching of the data was carried out.

The questionnaire consists of thirteen main sections, namely General Information, Organisation, Collection, Digitisation, Packaging, Archival Storage, Ingestion, Asset Management, Metadata, Rights Management, Access, Exchange, and Emerging Needs. On the other hand the Knowledge schema has seven classes, namely Report, Header, Organisation, Need, Dataset, Functional Requirements and Non-Functional

In a practical way, this stage was carried out by creating two columns in an Excel table, one for questions of the questionnaire and another one for classes of the Knowledge schema, with their properties. With some judgement, it was easy to see which questions were fitting which class and properties, which questions were not matching any property of any class, and which properties of the schema were not having any counterpart in the questionnaire. The three cases were identified (marked) with different colours.

When the classes Dataset, Functional Requirements and Non-Functional Requirements were compared against the questionnaire, it was found that there was no match of any attributes of these classes with questions of questionnaire because the Need class already covered them with its attributes. So, only classes Organisation and Need were matched. When class Report was matched with questionnaire, it was discovered that the class Report dealt with report numbers and so each questionnaire could be labelled as "Report 1" (questionnaire 1), as Report 2 (questionnaire 2) and so on.

Table 4 shows an excerpt of the matching process, which is shown in its full extent in Appendix C.

Let's see in detail the matching process, having the questionnaire as the central point:

General Information: all the questions were accommodated in the Header class of the Knowledge schema, as Header class covered everything in the questionnaire.

Organisation: some questions were matching with the Organisation class, but a number of questions were not pairing with any of the properties of Organisation class. Some questions like Size of Organisation, Size of Department, Target Audience/customers, and CoP Unit Operating Budget, did not have any place in the properties of the Organisation class. These questions have been marked in orange in Table 4 (a subset of the whole table shown in Appendix C).

Collection: This section of the questionnaire has many questions which were matched with properties of the class Need of the Knowledge schema, but for many questions such as "CoP Unit Collection Description, Collection Size, Collection Annual Growth, Collection percentage catalogued, Preservation program, Analogue collection size, Analogue collection annual growth, Size of analogue conversation, Annual growth of analogue conversation, Size of born digital, and Expected Annual growth rate of born digital content" it was not possible to match them to any class of the Knowledge schema. These questions could be accommodated in the Organisation class but there was no property which could accommodate them.

Digitisation: all the questions were accommodated in the class Need of the Knowledge schema.

Packaging (SIP): all questions were accommodated in the class Need of the Knowledge schema

Archival Storage: all the questions were accommodated in the class Need of the Knowledge schema.

Ingestion: all the questions were accommodated in the class Need of the Knowledge schema.

Asset Management: all the questions were accommodated in the class Need of the Knowledge schema.

Metadata: except for one question, all the other questions (metadata standard relevance) were accommodated in the class Need of the Knowledge schema

Rights Management: except for one question (Relevance of rights clearance), all the other questions (metadata standard relevance) were accommodated in the class Need of the Knowledge schema

Access: all the questions were accommodated in the class Need of the Knowledge schema.

Exchange: except for one question (how many times the organisation is involved in transfer media files) all the other questions were accommodated in the class Need of the Knowledge schema.

Emerging Needs: most of the questions could be matched to attributes of the class Need or the class Organisation.

The table below shows an excerpt from the complete table, which is shown in Appendix C.

Questions from Questionnaire	Properties of the Class "Organisation" (Knowledge Schema)
Type of Organisation	Position in economic space
Mission	Mission
Usage of Media	Usage of media
Sector company belongs to	Position in economic and political space
Position in Media Cycle	Position in media lifecycle
Size of Organisation	
Size of Department	
Target Audience/ Customers	
CoP Unit Operating Budget	
Collection	
CoP Unit Collection Description	Currently used technology
Collection Size	
Collection Annual Growth	
Collection percentage - catalogued	
Preservation Program	
Analogue collection size	
Analogue collection annual growth	
Is it Stored in Climate Conditions	Usage of media
Collection Physical formats	Usage of Technology
Plan to digitize Analog Collection	Desired technology
How digitizing collection	Currently used technology
Problem in digitization	Barriers
Size of Analog Conversion	
Annual growth of Analog conversion	
Size of Born Digital	
Expected Annual growth rate of Born digital content	

Table 4: Matching of Questionnaire's Organisation & Collection Sections with Knowledge Schema

4.3 Data Collection
As already explained, not all the members of the Prest4U CoPs could be interviewed, and out of twenty one members of the three selected CoPs, only fourteen were able to provide data through the questionnaires which they filled during the interviews. The table below lists the members who provided the data for this study.

Community of Practice	Members	Number of Questionnaires
Learning and Teaching Repositories	The Open University, Milton Keynes, United Kingdom	7
	Iuav University of Venice, Venice - Italy	
	Digital Repository of Ireland at the Royal Irish Academy, Dublin, Ireland	
	University College Dublin, Dublin, Ireland	
	University of Rome Sapienza, Rome	
	Screen Archive South East, Chichester, England	
	University Innsbruck, Innsbruck/Austria	
Video Production and Post Production	Parallel40, Barcelona, Spain	6
	VET Post Production and Training, London UK	
	Library and Sales department, CCMA- Televisió de Catalunya, Barcelona, Spain	
	Documentation, RTL Nederland, Hilversum, Holland	
	Infostrada Creative Technology, CMI holding, Hilversum, Holland	
	ENEX, Luxembourg	
Research and Scientific Collections	Scuola Normale Superiore, Pisa, Italy	1
	Total	14

Table 5: List of CoP members provided data for the study

4.4 Consolidation and Summarisation of Data
4.4.1 Stage 1
Matching Data from the Questionnaire with Knowledge Schema

Taking as starting point the Excel table prepared at Stage 0, it was possible to create one additional column for each questionnaire, filling it in with the data from the questionnaire, this time taking the Knowledge schema as the central point. Table 6 shows an excerpt of the complete table, which is shown in Appendix D.

Report: this class was not matched with Questionnaire because it was equivalent to 'Questionnaire'. It contains report number, Community of Practice name and member name.

Header: all the data from the questionnaire could be filled in properly.

Organisation: this class has accommodated many of the data in the questionnaire, but many other answers could not be matched with the properties of the class Organization. More precisely, they are: Size of Organisation, Size of Department, Target Audience/customers and CoP Unit Operating Budget in the "Organisation section" of the questionnaire; and "CoP Unit Collection Description, Collection Size, Collection Annual Growth, Collection Annual Growth, Collection percentage catalogued, Preservation program, Analogue collection size, Analogue collection annual growth, Size of analogue conversation, Annual growth of analogue conversation, Size of born digital, and Expected Annual growth rate of born digital content" in the "Collection section" These rows are highlighted in orange. Intuitively, these questions seem to belong to the class 'Organisation', but it was hard to find any particular property that could accommodate them. For identification and reference purposes, each member and each class was labelled. For example **R1_RSC_Scuola** refers to Report 1 of Research and Scientific Collections CoP and to member Scuola Normale (see Table 6).

Need: this class has many properties and is also related to the other classes "Dataset, Functional requirements, Non-functional requirements". Answers to questions such as "metadata standard relevance, relevance of Rights clearance, how many times you involved in transfer media files" could not be assigned to any property of the class "Need" and are highlighted in orange in the Excel table. On the other hand, in the "Digitization section" of the questionnaire, there were no questions which could provide values for other properties of the class "Need", such as "Desired Technology, Barriers, Requirements, and Involved Datasets". In the same manner, "Packaging and Ingestion, Barriers and

Requirements" were not having questions to fill them in. In case of Access, the question about barriers was not available. These properties are highlighted in green in the table of Stage 1 (Appendix D).

Dataset: Only the "title" attribute of class "Dataset" could be matched with one question and filled-in with values. However, the class "Dataset" has many attributes and some of them were filled-in by analysing other questions (from all the sections of the questionnaire) and by re-using some values already used in the properties of class "Need". For example, location from the general information section, language from country where organisation is located, locator from the class "Need", keywords and genre from the class "Need", target Audience from the "Organisation section" of the questionnaire. The attributes which were not filled at all were "contributor, creator, createDate, rating, relation, collection, policy, publisher, fragment, namedFragment, frameSize, and frameRate". The reason behind the inability to fill-in those attributes is due to the questionnaire not having the appropriate questions.

Functional Requirement The class "Functional requirement" has many attributes, but only one attribute, namely 'Description', could be matched with the data from the questionnaire. In each section of the questionnaire there was a question related to "Requirements", and their values were used to fill-in the Description property. The other twelve attributes of functional requirement could not be filled in.

Non-Functional Requirement: In the questionnaire no question was directly addressing "Non-Functional requirement", so some of its attributes were filled-in by taking values form different sections of the questionnaire. More precisely, the attributes "content coverage, performance efficiency, Usability, and Maintainability" were filled-in.

Questions from Questionnaire	Properties of the Class "Organisation" (Knowledge Schema)			
	Report Number	1	2	3
	Originated from	R1_RSC_Scoula	R2_LTR_OpenUniv	R3_LTR_IuavUniv
	Name of the organization	Scoula Normale Superiore, Pisa	The Open University, Milton Keynes, UK	Iuav Univ. of Venice, Italy
Type of Organisation	Position in economic space	Higher education	Higher education	Higher education
Mission	Mission	The formation of scholars, professionals and citizens with a wide cultural background and with a strong critical attitude.	To be open to people, places, methods and ideas. We promote educational opportunity and social justice by providing high-quality university education to all who wish to realise their ambitions and fulfil their potential. Through academic research, pedagogic innovation and collaborative partnership we seek to be a world leader in the design, content and delivery of supported open learning.	The mission of the Video library is specialized the collection on documentaries about architecture, planning, design, and to make available the AV materials to the users. Other mission of the Video library is preserving the AV materials produced by Iuav University through digitalizing them.
Usage of Media	Usage of media		AV production for teaching and informal learning and promotion for General public, Students/Teachers	Collecting, screening AV media during lessons and seminars for education & research for Students/Teachers
Sector company belongs to	Position in economic and political space	Public	Public	Public
Position in Media Cycle	Position in media lifecycle	Content and archive management, Technical management	Content and archive management, Technical management, Sales and rights management, and Distribution	Content and archive management, Technical management
Size of Organisation		> 1000	> 1000	>500
Size of Department		10 to 20	50 to100	< 5

Questions from Questionnaire	Report Number	1	2	3 4. Analysis and Interpretation
	Originated from	R1_RSC_Scoula	R2_LTR_OpenUniv	R3_LTR_IuavUniv
Target Audience/ Customers		Public institutions and Teachers and student	Students/Teachers, General public	Students/Teachers
CoP Unit Operating Budget		< 10,000 euros		< 10,000 euros
CoP Unit Collection Description		Audio	Audio, Video & Film	Video
Collection Size		1.000 - 10.000 hours	10.000 to 25.000	1.000 - 10.000
Collection Annual Growth		< 1.000 hrs	< 1.000	< 1.000
Collection percentage - catalogued		50 to 100 %	50 to 100 %	50 to 100 %
Preservation Program		Yes	Yes	No
Analogue collection size		< 1.000	10.000 to 25.000	1.000 to 10.000
Analogue collection annual growth			< 500	from 10 to 50
Is it Stored in Climate Conditions	Usage of media		Yes	No
Collection Physical formats	Usage of Technology	Reel-to-reel, DAT & MII	Film, Betacam, 1", 2", Umatic, Reel to reel, DAT, VHS, Digital betacam, DVD, audio cassette, Vinyl records	Betacam, 1", Umatic, DVD video & VHS
Plan to digitize Analog Collection			Yes	Yes
How to digitize			Both	Using internal expertise and equipment
Problem in digitization				
Size of Analog Conversion			1.000 - 10.000	< 1.000
Annual growth of Analog conversion			< 500	< 500
Size of Born Digital				< 1.000
Expected Annual growth rate of Born digital content				< 500

Table 6: Organisation class data table

4.4.2 Stage 2
Modelling of 'Need' concept through OAIS reference model and Questionnaire

Generally speaking, a need belongs to any function or activity that takes place during the audio - visual preservation process. The need can be based on the submission of collection into a database management system, or on its storing in a repository, or about issues related to its management and administration, or about issues related to collection access, sustainability, budget and tools etc. In other words, every Need could belong to anyone of the examples above. However, it is necessary to represent in a more formal way the activities or functions mentioned above that represent a "Need". The Open Archival Information System (OAIS) reference model was used as the theoretical base to represent a Need, by categorising it among the different functions of the audio visual preservation process.

But now a question may arise: why there is a requirement of this "new" reference model, since we already have the Knowledge schema. The main answer is that the class "Need" of the Knowledge schema is very broad and does not have any connection with the OAIS reference model. Framing it in the general OAIS model would make it more precise, and would make it easier to match the preservation needs with the available tools and functionality, which is the ultimate goal of Presto4U. Very often tools and functionality are described in term of the OAIS functional units (Ingestion, Archival Storage, Data Management, Access, Administration, and Preservation Planning).

The extended model is depicted in Figure 11, where the OAIS six functional units are at the first level. Each functional unit is then sub-categorised in two levels, keeping in mind both the properties of the class "Need" of the Knowledge schema and the questions of the questionnaire. In the next stage (Stage 3) we will see how the data from Stage 1 can be transferred to this model.
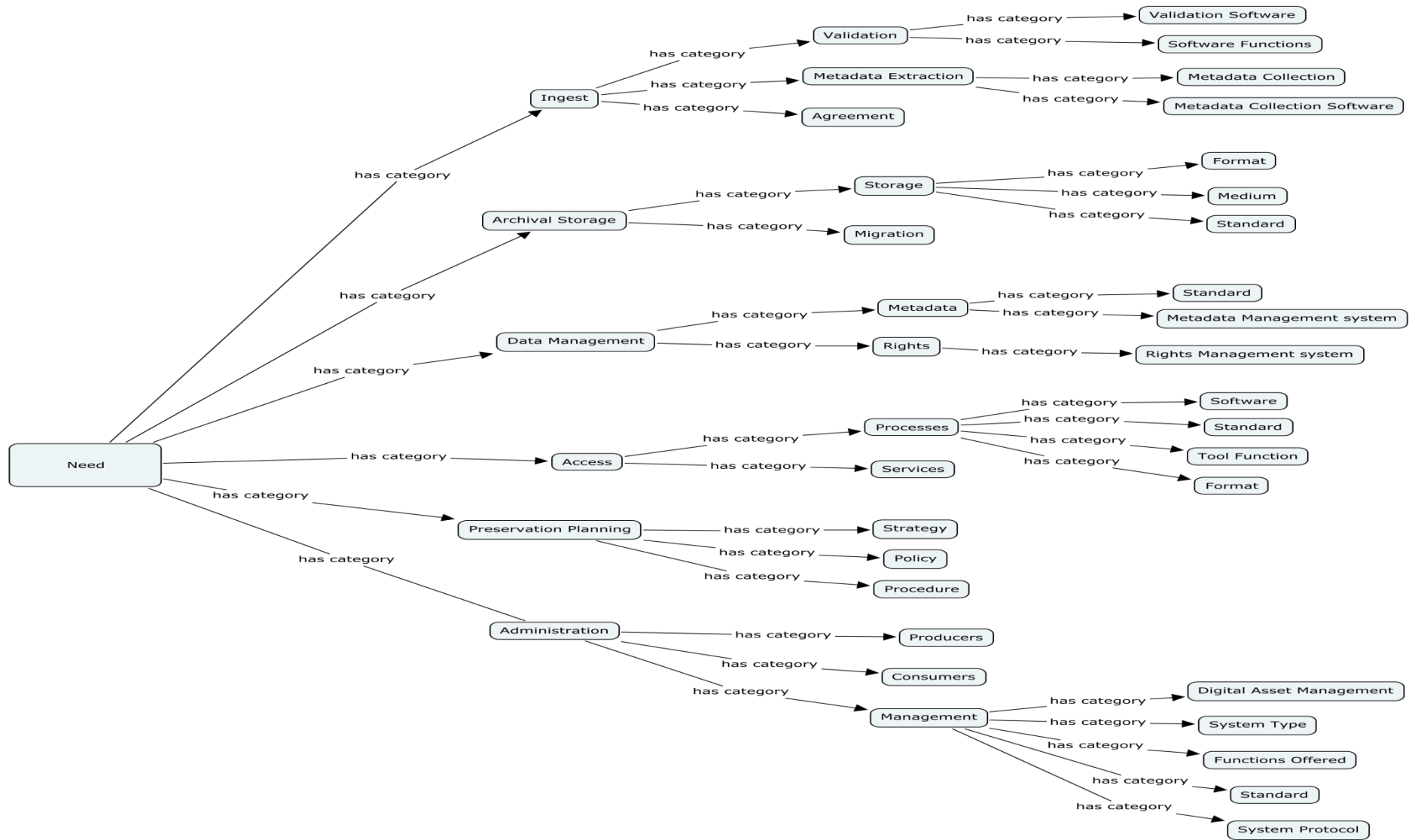
Figure 11: Concept map showing 'Need' expressed in terms of OAIS Reference Model and Questionnaire

4.4.3 Stage 3
Presenting the data as 'Need' concept expressed in terms of OAIS Reference Model and Questionnaire in class Need with its properties

At this stage the data of Stage 1 is mapped into the new concept of Need (developed in Stage 2). To do the mapping, we use again an Excel table. The rows of the table correspond to the "OAIS Need". They are shown in the first three columns of the table, corresponding to the three levels of the concept map. An excerpt of the table is shown in Table 7, and the complete table is shown in Appendix E. Then the other columns of the table are defined to correspond to some of the properties of the class "Need" of the Knowledge schema, starting with the "Involved dataset". More precisely, the property "Involved dataset" is assigned to the fourth column of the Excel table, the property "Currently used technology" is assigned to the fifth column of the Excel table, and so on for the remaining properties, i.e. "Reason for dissatisfaction", "Desired technology", "Barriers", Functional Requirements" and "Non-functional Requirements".

At this point the data in each column of the Excel table filled in in Stage 1 (which was containing data coming from just one questionnaire of a CoP member) is used to fill-in the Excel table just defined, resulting in 13 new tables. For example, the Open University, Milton Keynes, United Kingdom is shown in Table 7. In the same fashion, tables for the fourteen members who answered the questionnaire were filled-in, representing their Needs. In other words, a table covers all the categories of Need of a given organization, with respect to the OAIS reference model's six functional units and their sub-categories. At the same time, those needs can be better understood looking at them from the perspective of the class "Need" of the Knowledge schema, whose main properties appear as the heading of the columns. In order to better fill the table for each organization, also values from other categories were taken into consideration. These categories were Digitization (with software, standard and hardware) and Packaging (tools, codec and wrapper, standard).

The Class Need has tried to find answers to some questions related to need like "Which technology is used currently, Is there any reason for dissatisfaction, Is there any other technology which can overcome the dissatisfaction, Is there any desired technology, Is there any barrier which restricts the organisation to adopt that technology, Which dataset creates the need". The table should help also to try and define the Functional and Non-functional Requirements, based on which the need arise.

In Appendix E, for each Community of Practice involved in the study, there is an additional table summarizing the main properties of the class Organization of the Knowledge schema. This table tries to capture the answers to questions like "What is mission of organisation, What is position of organisation in media cycle and economic and political cycle, What is usage of media, What is the purpose and business of using media in the organisation, What is the usage of technology". These questions were answered through four main properties of Organisation, namely Mission, Position (in Media cycle and in economic & political scenario); Usage of Media and Usage of technology. But data for the Usage of Technology property was not available directly, it was divided into two "sub-categories", namely Usage of Hardware and Usage of Software

This step was a difficult one, as it involved much judgment in assigning the data from the questionnaire to the appropriate entries in the table. In some cases, Functional and Non-functional requirements were not mentioned directly, so it was necessary to find them in the data related to Need.

Need Table - The Open University, Milton Keynes, United Kingdom - Learning and Teaching Repository Community of Practice

Category of Need			Involved Dataset	Currently Used Technology	Reason of Dissatisfaction	Desired Technology	Barriers	Requirements		
OAIS Steps	Sub Categories	'Need' Detail Category						Functional Requirements	Non-functio Requiremen	
									Quality in Use	Internal & External Quality
Ingestion	Validation	Validation Software	FFMPEG	Checksum Software, FFMPEG	Configuration can be complex, output in XML would be preferred			Validation software FFMPEG during checksum or validation of files should make configuration easy and provide output in XML		
		Software Functions		Checksums, Digital signatures						
	Metadata Extraction	Metadata Collection		Descriptive and Technical metadata						
		Metadata Collection Software		JHOVE, FFMPEG other Unix tools, we also take descriptive metadata from exported database content (existing Library catalogue). N.B. System in development. Regularly reviewing tools in development	No	No				
	Agreement									
Archival Storage	Storage	Format		Analog and Digital				File storage, File restore, Output streaming, Multifile restore, File search, File/folder tagging, Integrity check, Format migration, Calculate checksums on upload, Manage automatic workflows		
		Medium	storage	Computer tape, hard Disk, Digibeta	Limited life span	Large Scale spinning disk system				Performance efficiency - Capacity
		Standard								
	Migration									
		Standard	Metadata	MARC21, DublinCore, METS, PREMIS, W3C,				Multiple requirements - including examples given. Metadata		

Data Management	Metadata			EBUCore, VRA Core4, MODS, ISAD(G)/EAD, DC Collection, WARC, XCRI					harvesting, exporting, transformations of metadata to other standards, linked data capabilities e.g. triple stores, SPARQL queries, applications to enhance data with information from other linked-data sets		
		Metadata Mgt. System		Multiple systems in use with Metadata standards. Principally Fedora, also Voyager Library Management System/Catalogue							
	Rights Management	Rights Mgt. System		Yes	RDF limitations within RELS-EXT (Fedora external relationships expressed as RDF (linked data)	No	None, we are adopting the technology (in development)				
Access	Processes	Software		Fedora web interface - in development	Need to produce several versions of access files to ensure accessibility by different browsers. Potentially, some access formats are proprietary						Usability - Accessibility
		Standard		Conforms to OAIS model							
		Tool Function		Search of content, Retrieval of content, Format conversion, Web access		No					
		Format		FLV, MP3, MP4, H264,							
	Services	Access to AV		Lending of analogue format, Production and delivery of digital files on request, Lending of digital format (DVD, CD etc.), On site viewing/listening via dedicated computer stations, University library online portal, U Tube, iTunes.					Content needs to be fully accessible to staff and students where appropriate		
Preservation Planning											

Administration	Management	Digital Asset Management		Fedora - in development	No				
		System Type		Open source					
		Function Offered		Ingestion, Cataloguing, Search of content, Storage of content, Retrieval of content, Rights management, Revision control, Doc. of preservation process					
		Software Protocol		OAIS, HTTP-REST, IIOP					
		Standard		OAIS					
		Type of User Interface		Bespoke - in development					
	Producers								
	Consumers								
Digitization		Software			No				
		Standards		External Advice					
		Hardware		Outsourced 2 inch and 1 inch to external vendor. Outsourced D3 to external vendor. In-house - used Umatic players, Digibeta players, Conversion card for PC.					
Packaging (SIP)	Tool	Formatting Tool		Final cut pro (Apple) Premiere (Adobe)					
		Error & Integrity Checks Tool		External Companies	No	No			
	Codec & Wrapper	Audio Codec		Linear Pulse Code Modulation (LPCM)					
		Audio Wrapper		WAV					
		Video Codec							
		Video Wrapper		AVI (Windows)					
	Standard	Standards							

Table 7: Need Table - The Open University, Milton Keynes, United Kingdom - Learning and Teaching Repository Community of Practice

4.4.4 Stage 4

Specifying the consolidated data into the Knowledge schema (Classes Need, Dataset, Functional requirement, and Non-functional requirement with all properties)

At this stage, out of the fourteen organisations that participated in the study, only eleven were considered, as the other three, based on the data in the questionnaire summarised in the table developed at Stage 3, had not expressed any need.

The Stage 4 deals with specifying the consolidated data into properties of each class of the Knowledge schema. In Stage 4 new (and final) summary tables are built, one for each class of the Knowledge schema. Based on the Report number, tables for class "Header" and class "Report" were easy to build. They are shown, together with tables of the other classes, in Appendix F.

According to the aim of Presto4U, the most important class was Need, so starting with the 13 tables developed at Stage 3, each one was examined to extract one or more needs. The extraction process was largely based on judgement, by looking at the values in the last seven columns, which were associated with the main properties of class Need in the Knowledge schema. The result is summarised in Table 8, where the rows correspond to the main properties of Need (the last seven columns in Table 7) and each column is representing a "need" of the organization that provided the questionnaire. For ease of reference, each column has a new label (Need1, Need2, etc.) and the first two rows of the table have the indication of the report and the organization that provided the data. A more detailed description of the meaning of each row in Table 8 is here below.

Need Class: This class is the core of the Knowledge schema as it allows expressing all needs of an organisation through its several attributes/properties. A total of 18 needs were found from eleven organisations. Table 8 below shows an example of five "needs" and all other are available in Appendix F.

- o Need - the statement expressed in general as well as technical terms to explain the need. Each need is numbered as **need1, need2** and so on to better identify them at any stage. Another label was also provided to show which need belong to which report or CoP or organisation. For example **R1_RSC_Scuola** shows that the need comes from Report1 of the Research and Scientific Collections CoP Scuola Normale.
- o Involved Dataset - the dataset to which this need belonged to. In the table, the Dataset was not described, but only a label was provided, such as **Gra.Fo, Storage** etc. Since Dataset is a Class, its complete description is given in another table (again, see Appendix F).
- o Currently used technology - the technology that the organisation is using now for AV preservation.
- o Reason of dissatisfaction - the reasons by which an organisation was not satisfied in using a particular technology was expressed through this attribute.
- o Desired technology - it is the technology that could solve the current problems and bring satisfaction in AV preservation.
- o Barriers - These are the hurdles or problems that an organisation is facing (in general and technical terms) to acquire a desired technology.
- o Requirements - This property is also a separate class in the knowledge schema. Requirements can be expressed as Functional or Non-functional requirements. Here again only a label is provided, as the full description is provided in another table. The labels used were **FR1, FR2** and so on for Functional requirements and **NFR1, NFR2** and so on for Non-functional requirements.

Propreties of Class "Need" (Knowledge Schema)	need1	need2	need3	need4	need5
Report Number	1	1	2	2	2
Need Belongs to	**R1_RSC_Scoula**	**R1_RSC_Scoula**	**R2_LTR_OpenUniv**	**R2_LTR_OpenUniv**	**R2_LTR_OpenUniv**
Need	Chemical analysis of analog audio material in order to apply available solutions	Software custmization and updation	Storage medium with large scale spinning disk system	Possibility to provide single version of access files to get accessible by different browsers.	Need better validation software
Involved Datasets	Gra.Fo	Gra.Fo	Storage	Fedora Web	Ffmpeg
Currently used Technology	Applied Solutions to current software but doesn't work	Gra.Fo Project specific software	Computer tape, hard disk and Digibeta	Fedora Web Interface	Checksum software, FFmpeg
Reason of Disatisfaction	They are not able to identify chemical issues of problematic audiotapes	Not custmizable, Not supported anymore	Limited life span	Need to produce several versions of access files to ensure accessibility by different browsers. Also some access formats are proprietary	Configuration is complex and output format issue
Desired Technology or Service	Audio tape chemical analysis service	mediARC software of NOA company	Large scale spinning disk system	No	
Barriers	No chemical analysis service providers for audio tapes exists. Funding	Price			
Requirements	NFR1	FR1	NFR2	NFR3	FR3
				FR2	

Table 8: Need Table at Stage 4

The next table developed at Stage 4 was the one summarising the class Dataset, where each row corresponds to an attribute of the class, and the each column corresponds to one of the Dataset identified in the Need table (see Appendix F). Here is a brief description of all the attributes.

Dataset: This class has many attributes/properties, briefly described below with their meanings. Here a Dataset was associated with every Need, if not provided at Stage 1.

- o identifier: A tuple identifying a resource, which can be either an abstract concept (e.g., Hamlet) or a specific object, using a URI. The type can be used to optionally define the category of the identifier.
- o title: A tuple providing the title or name given to the resource. The type can be used to optionally define the category of the title.
- o language: The language used in the resource. Recommended best practice is to use a controlled vocabulary such as [BCP47].
- o locator: The address at which the resource can be accessed (e.g. a URL, or a DVB URI).
- o contributor: A tuple identifying the agent (with either a URI, if it exists, or plain text) and the nature of the contribution, e.g. actor, cameraman, director, singer, author, artist.
- o creator: The author of the resource and the role. The author identifier can be defined as either an URI (which is best practice) or as plain text. The role is defined as plain text
- o createDate: The date defines the date and time that the resource was created. The type defines the particular category of creation date (e.g., release date, date recorded, date edited).
- o location: A location name and/or data where the resource has been shot/recorded.
- o description: Free-form text describing the content of the resource.
- o keyword: A concept, descriptive phrase or keyword that specifies the topic of the resource. A recommended best practice is to take this keyword from an ontology or a controlled vocabulary.
- o genre: The category of the content of the resource. Recommended best practice is to use an ontology or a controlled vocabulary such as the EBU vocabulary.
- o rating: A tuple defining the rating value, the rating person or organization (as a URI or a string), and the voting range (min. value, max. value).
- o relation: A tuple identifying a resource to which the current resource is related and optionally, the nature of the relationship. An example is a listing of content that has a relationship (possibly a named) to another content.
- o collection: The URI (best practice) or the name of the collection from which the resource originates or to which it belongs.
- o copyright: The copyright statement associated with the resource and optionally, the identifier of the copyright holder.
- o policy: A description of the security policy applying to the media resource, or a reference to the security policy (e.g., Creative Commons). The type attribute can be used to provide more information as to the nature of the security policy (e.g., permissions, access control, ownership).
- o publisher: The publisher of a resource.
- o targetAudience: A tuple identifying the issuer of the classification (parental guidance issuing agency, targeted geographical region) and the value given in this classification.
- o fragment: A tuple containing a fragment identifier and its role. A fragment is a portion of the resource, as defined by the [MediaFragment] Working Group.
- o namedFragment: A tuple containing a named fragment identifier and its label.
- o frameSize: The frame size of the resource, if applicable. For example: w:720, h:480. It is optional to specify the units; the default value is pixels.
- o compression: The compression type used. For container files (e.g., QuickTime, AVI), the compression is not defined by the format, as a container file can have several tracks with different encodings. In such a case, several compression instances will exist. Thus, querying the compression property of the track media fragments will return different values for each track fragment. Note: it is possible to use an extended MIME type as the value for this property, see [RFC 4281].
- o duration: The actual duration of the resource. The unit is defined to be seconds.

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- o format : The MIME type of the resource (e.g., wrapper, bucket media types).
- o samplingRate: The audio sampling rate. The unit is defined to be samples/second.
- o framerate: The video frame rate. The unit is defined to be frames/second.
- o averageBitRate: The average bit rate. The unit is defined to be kbps.
- o numTracks: The number of tracks of a resource, optionally followed by the type of track (e.g., video, audio, subtitle).

The data collected has shown that not all the properties could be filled or required to describe a single dataset. In our table, each dataset is connected, through labels such as **R1_RSC_Scoula_need1_2**, to the report, the organization and the need expressed for that Dataset. In our example, it refers to Report1 of Research and Scientific Collections CoP Scuola Normale Need1 and Need2. It can be seen that properties like title, language, locator, location, keywords, genre, and target audience were mostly filled for each dataset. Table 9 below shows some Datasets, and all Datasets are available at Appendix F.

Properties of Class "Dataset"							
Dataset Belong to	R1_RSC_Scoula_need1_2	R2_LTR_OpenUniv_need3	R2_LTR_OpenUniv_need4	R2_LTR_OpenUniv_need5	R3_LTR_IuavUniv_need6	R3_LTR_IuavUniv_need7	R4_LTR_UnivDublin_need8
title	Gra.Fo	Storage	Fedora Web	Ffmpeg	Video_Streaming	Metadata	Digital_Asset
language	Italian	English	English	English	Italian	Italian	English
locator	Server/ Database	Storage medium	Server/ Database	Server/ Database	Server/ Database	Server/ Database	Server/ Database
contributor							
creator							
createDate							
location	Tuscany	Milton Keynes, UK	Milton Keynes, UK	Milton Keynes, UK	Venice, Italy	Venice, Italy	Dublin, Ireland
description							
keyword	Audio, Gra.Fo software, preservation	Storage, storage devices, life span	Access, file version	Checksum, validation, configuration	Video, Streaming, software	Metadata, video	Asset management, DAM
genre	Audio	Storage	Access	Validation	Video	Video	Asset management
rating							
relation							
collection							
copyright	Preservation, half Online, In-house Access						
policy							
publisher							
targetAudience	Researcher, students, teachers	Researcher, students, teachers	Researcher, students, teachers	Researcher, students, teachers	Researcher, students, teachers	Researcher, students, teachers	Researcher, students, teachers
fragment:							
namedFragment:							
frameSize:							
compression:	PCM, WAV, 96k , 24 bit (Mono/Sterio)						
duration	2800hrs						
format	WAV						
samplingRate	96						
frameRate							
averageBitRate	fixed, 96-24 bit						
numTracks	102 audio						

Table 9 : Dataset table at Stage 4

The next summary table built was for class Functional requirements. In this table the rows are associated with the properties of the class, and the columns are associated with the Functional requirements identified in the table Need.

Functional Requirement: this class has thirteen properties to express a Functional requirement as briefly mentioned below.

- o actor: the role within the organization that owns the requirement, that is going to use the required functionality
- o description: a brief description of the reason for and outcome of the use case, or a high-level description of the sequence of actions and the outcome of executing the use case.
- o notesAndIssues: a list of any additional comments about use case or any remaining open issues
- o normalCourseOfEvents: a detailed description of the user actions and system responses that will take place during execution of the use case under normal, expected conditions
- o alternativeCourses: a description of courses of events that are less common but not exceptional
- o exceptions: any anticipated error conditions that could occur during execution of the use case, and define how the system is to respond to those conditions.
- o includes: any other use cases that are included ("called") by this use case. Common functionality that appears in multiple use cases can be split out into a separate use case that is included by the ones that need that common functionality.
- o specialRequirements: Identify any additional requirements, such as non-functional requirements, for the use case that may need to be addressed during design or implementation. These may include performance requirements or other quality attributes.
- o assumptions: List any assumptions that were made in the analysis that led to accepting this use case into the product description and writing the use case description.
- o pre-conditions: List any activities that must take place, or any conditions that must be true, before the use case can be started
- o post-conditions: Describe the state of the system at the conclusion of the use case execution.
- o priority: Indicate the relative priority of implementing the functionality required to allow this use case to be executed
- o frequencyOfUse: estimate the number of times this use case will be performed by the actors per some appropriate unit of time

Each Functional requirement was named **FR1, FR2** etc. in the Need table, and also each functional requirement is connected to a particular need and that is identified through a label such as **R2_LTR_OpenUniv_need4.** This label indicates that the Functional requirement comes from Report2 of the Learning and Teaching Repositories CoP Open University, expressing Need4. The complete table is available at Appendix F.

Also the table for Non-functional requirement was built. Again, in this table the rows are associated with the properties of the class, and the columns to the Non-functional requirements identified in the table Need.

Non-Functional Requirement: The properties of Non-functional requirement are divided into two main categories: quality in use; internal and external quality.

Following the same schema as the Functional requirement, each Non - functional requirements was named **NFR1, NFR2** etc. in the Need table. For example, **R2_LTR_OpenUniv_need4** refers to Report2 of the Learning and Teaching Repositories CoP Open University, expressing Need4. The complete table is available at Appendix F.

Foe completeness, as the Knowledge schema has seven classes, we describe here the tables for the remaining classes.

Report Class: This class is a container of the needs of an organisation. It involves basically these three properties or attributes: Report number, Community of practice, and Community of practice member name.

Header Class: This class provides general information about the Report. The properties are: Report number, Community of practice, Interviewer, Organisation name, Date, Place and Form of Meeting. As it can be seen from these properties, all of them were easily filled up. The form of meeting means the way Interview was conducted for example face to face, Skype, official meeting, conference etc.

Organisation Class: This class has total of five properties/attributes to explain the organisation. These properties are as follows
- o Mission - it tells what the mission of organisation is in general or mission of organisation for audio visual preservation.
- o Position in media lifecycle - it expresses what organisation is doing in terms of media lifecycle like content and archive management, technical management, sales and rights management, distribution etc.
- o Position in economic and political space - it states the position of organisation is it public or private or commercial.
- o Usage of media - this property gives the overview of usage of media by an organisation like AV production for teaching and learning, archiving for future generations and so on.
- o Usage of technology - it contained information about hardware, software and methodologies used by a particular organisation to fulfil various processes of audio visual preservation. It was a challenge to separate out the hardware, software and methodologies at this stage in this property.

To identify which organisation the data of a specific questionnaire belonged to, a label was created. For example **R8_PPVP_VETPostPT** has three different components, the first one is the report number (R8), the second one is name of the CoP (PPVP), and the final one is the name of the organisation (VETPostPT). All the tables are available in Appendix F.

4.4.5 Stage 5
Categorisation and Summarisation of Data with Findings
As a final step, the Dataset identified at Stage 4 were categorised with respect to extended OAIS Need concept (developed in Stage 2) and with respect to three main AV categories, namely Audio, Video and Image. The result is shown in the Table 10 here below. The rows are again the main properties of the class Need and the columns are the functional units of the OAIS reference model, for the three categories above.

Audio - Gra.Fo

Video - Common_archive, Digital_asset, Video_streaming, Metadata, Search, Video_digitisation, Metadata, Right_management, Archival_storage,Storage, Search, Fedora_web

Image - Image Quality

The labels mentioned above are the datasets that belong to a particular need dealing with that particular audio visual content. This summary table has allowed to discover that Ingestion has one need, Archival storage and Data management have four needs each, Access has six needs, Preservation planning has one need and Administration has two needs under it.

Need Related to	Video				
Need Belong to	Ingestion	Archival Storage			
Propreties of Class "Need" (Knowledge Schema)	need5	need3	need9	need13	need17
Report Number	2	2	5	7	11
Need Belongs to	**R2_LTR_OpenUniv**	**R2_LTR_OpenUniv**	**R5_LTR_ScreenArchive**	**R7_PPVP_Parallel40**	**R11_PPVP_ENEX**
Need	Need better validation software	Storage medium with large scale spinning disk system	Need practical solutions for ingest, processing, output and a digital carrier that can be guarantee to last for hundred years	Need a common archive or joint venture on european or world level plateform	Need Long term storage software
Involved Datasets	Ffmpeg	Storage	Storage	Common_archive	Archival_storage
Currently used Technology	Checksum software, FFmpeg	Computer tape, hard disk and Digibeta	Hard disk, digital mass storage system as Storage medium	No	Have a backup archive
Reason of Disatisfaction	Configuration is complex and output format issue	Limited life span	No guarantees of long term access		
Desired Technology or Service		Large scale spinning disk system	Technology for long life and high resolution of film		Need storage software that can provide visibility of what is going on in archive and to have long term archive
Barriers					
Requirements	FR3	NFR2	FR5	FR6	FR8
					FR10

Table 10 : Need Table stage 5

Need Related to	Video				
Need Belong to	Data Management				Preservation Planning
Propreties of Class "Need" (Knowledge Schema)	need18	need12	need7	need10	need11
Report Number	2	6	3	5	5
Need Belongs to	R2_LTR_OpenUniv	R6_LTR_InnsbruckUniv	R3_LTR_IuavUniv	R5_LTR_ScreenArchive	R5_LTR_ScreenArchive
Need	Better Technology to access through to Metadata and information representation	Need suitable tool for rights management	Technology to manage the metadata of all digital objects	Technology to input user metadata flexibly	Create Master Archive Package
Involved Datasets	Metadata	Rights_management	Metadata	Metadata	Digitization
Currently used Technology	Fedora Web Interface and Voyager libray management system/catalogue	No	University library online portal, e-Learning platform	CatDV, our own custom Filemaker Database with fields to collect basic technical metadata	Davinci Resolve, Final Cut Pro 7 and X, Avid, Premiere, Blackmagic Media Express, Soundtrack Pro, CatDV, Nuke
Reason of Disatisfaction	Yes , RDF limitations within RELS-EXT (Fedora external relationships expressed as RDF) linked data			Cannot input user metadata in flexible manner.	Price and availability of Scanners especially small gauge. Photochemical Laboratories, Film Stocks
Desired Technology or Service	No		A software/tool to manage preservation and access (consultation) in a coordinated way.		
Barriers		No suitable tool available for our rights model, Limited human resources			
Requirements	FR9		FR13	FR12	
	-				

Table 10 : Need Table stage

Need Related to	Video			Audio		Image	Video	
Need Belong to	Access						Administration	
Propreties of Class "Need" (Knowledge Schema)	need4	need6	need16	need1	need2	need15	need8	need14
Report Number	2	3	10	1	1	9	4	8
Need Belongs to	R2_LTR_OpenUniv	R3_LTR_IuavUniv	R10_PPVP_RTLNederland	R1_RSC_Scoula	R1_RSC_Scoula	R9_PPVP_CCMA	R4_LTR_UnivDublin	R8_PPVP_VTPostPT
Need	Possibility to provide single version of access files to get accessible by different browsers.	Need technology for video streaming	Need Updation of AVID software	Chemical analysis of analog audio material in order to apply available solutions	Software custmization and updation	Need access to high quality images in archive	Need Better Digital Asset Management System	Need digital asset mgt system i.e compatible with post production editing suites
Involved Datasets	Fedora Web	Video_Streaming	Search	Gra.Fo	Gra.Fo	Image_quality	Digital_Asset	Digital_Asset
Currently used Technology	Fedora Web Interface	Cataloguing bibliographic software SOL - Sebina Open Library, part of SBN - Servizio Bibliotecario Nazionale. The software has fields for AV materials, with the rules of guida alla catalogazione in sbn. materiale moderno.	Online AVID software	Applied Solutions to current software but doesn't work	Gra.Fo Project specific software	In-house tool PROA provide access to images to multiple users	Extensis Portfolio	No
Reason of Disatisfaction	Need to produce several versions of access files to ensure accessibility by different browsers. Also some access formats are proprietary	Need technology (hardware and software) for streaming the video.	Less search functionalities, Old tool	They are not able to identify chemical issues of problematic audiotapes	Not custmizable, Not supported anymore	Access to offline reduced-quality copies of footage in archive	Scalability issues and resources.	
Desired Technology or Service	No	Need a Streaming server	Updated version of AVID	Audio tape chemical analysis service	mediARC software of NOA company	No	Institutional-level DAM.	ISIS, Interplay as digital asset management system
Barriers				No chemical analysis service providers for audio tapes exists. Funding	Price			Funding
Requirements	NFR3	FR4	FR7	NFR1	FR1		NFR4	FR11
	FR2							NFR5

Table 10 : Need Table stage 5

In the next Table 11 are shown the barriers faced by the different CoPs It appears that those barriers are more of a general nature, rather than technical ones. To summarise, money, time, skilled human resource, legal (IP, copyright, rights constraints) are main the general barriers of all communities of practice. Beside that, Infrastructure (software or hardware environment not supporting new technologies) and Risks (adoption of new technology implies new risks to deal with that must be assessed and managed) are also big hurdles for these CoPs. Technology to manage metadata, tools for rights management, and metadata schema were in demand from all the CoPs.

4.5 Summary of Barriers faced by the Communities of Practice

Learning and Teaching Repository CoP		
Name of Member	General	Technical
The Open Univ.		
Iuav Univ. of Venice	Funding Issues	Technology for managing the metadata of all kind of digital objects produced at Iuav University No suitable tool available for our rights model Skills (new expertise and trained staff need to be acquired for adoption and implementation of new technology)
Royal Irish Academy	Legal (IP, copyright, rights constraints), Financial	
Univ. College Dublin	Legal (IP, copyright, rights constraints), Financial, Risks (adoption of new technology implies new risks to deal with that must be assessed and managed)	
Univ. of Rome	Legal (IP, copyright, rights constraints), financial	
Screen Archive South East	Financial, Infrastructure (lack of compatibility with existing hardware/software), Legal (IP, copyright, rights constraints)	
Univ. of Innsbruck	Financial, Infrastructure (lack of compatibility with existing hardware/software), Limited human resources,	No suitable tool available for our rights model
Research and Scientific Collections CoP		
Scuola Normale Superiore, Pisa	Financial, Legal (IP, copyright, rights constraints)	Metadata Schema
Post Production and Video Production CoP		
Parallel40, Barcelona, Spain	Risks (adoption of new technology implies new risks to deal with that must be assessed and managed), Time and money, Funding issues, No skills available, No buying in from decision makers, No human resources	
VET Post Production and Training, London	Huge burden is R&D time to assess and then implement new solutions, Financial	
CCMA- Televisió de Catalunya, Barcelona		

Documentation, RTL Nederland	Financial, Legal (IP, copyright, rights constraints), Infrastructure (software or hardware environment do not support new technology), Time	
ENEX, Luxembourg		

Table 11: Barriers faced by the Communities of Practice

Finally, in Table 12, we show the desired technologies foe each CoP. It shows that the areas where technology is mostly desired are storage, streaming, preservation, digital asset management, high resolution. More specifically, according to the collected data, long term storage, server for streaming, software for preservation management and access, digital asset management at institutional level, high resolution of film, audio management software, AVID software, storage software that can provide report on archive functioning and usage; audio tape chemical analysis are the main desired technologies and services among these communities.

4.6 Summary of Desired Technology by Communities of Practice

Learning and Teaching Repository CoP		
Name of Member	Technology	Service
The Open Univ.	Large scale spinning disk system for storage	
Iuav Univ. of Venice	Need a streaming server for video collection A software/tool to manage preservation and access (consultation) in a coordinated way.	
Univ. College Dublin	Institutional-level DAM for all collection	
Screen Archive South East	Technology for long life and high resolution of film	
Research and Scientific Collections CoP		
Scuola Normale Superiore, Pisa	mediARC software of NOA company for audio	Audio tape chemical analysis service
Post Production and Video Production CoP		
VET Post Production and Training, London	ISIS, Interplay as digital asset management system	
Documentation, RTL Nederland	Updated version of AVID	
ENEX, Luxembourg	Need storage software that can provide visibility of what is going on in archive and to have long term archive	

Table 12 : Desired Technology by Communities of Practice

4.7 Chapter Summary
The process of matching the questions of Questionnaire with the classes and properties of the Knowledge schema was carried out in Stage 0, by defining an Excel table (see Appendix C). A total of twenty one members belonging to three CoPs were invited to take part in the study, but only fourteen could be Interviewed and provided data about their needs. In Stage 1 the data from the questionnaires was filled-in in the table developed in Stage 0, where each subsequent column was corresponding to a questionnaire, and its entries were filled-in with values from the questionnaire, when available (see Appendix D). In Stage 2 the "Need" concept was extended and refined taking into account the OAIS reference model and the questions of the Questionnaire, in order to have a better understanding and categorisation about the needs expressed in the questionnaire data. In Stage 3 the data was filled-in in a new Excel table, where the rows were associated with the categories of the extended OAIS Need model and the columns were associated with some of the properties of the class "Need" of the Knowledge schema (see Appendix E). The problem at this stage was that in many cases

the Functional and Non-functional requirements were not mentioned directly in the data, so they had to be found (applying some judgement) in the other data related to Need.

The next stage was Stage 4 that dealt with specifying the consolidated data into knowledge schema (Classes Need, Dataset, Functional requirement, and Non-functional requirement with all properties). At this stage only eleven organizations were considered, as the others had not expressed any need in their answers. In this Stage seven tables were built, one for each class of the Knowledge schema. The first one to be built was the Need table, consolidating data from the 13 tables built at Stage 3. In this table, the rows were associated with the main properties of Need, and the columns were associated with the 18 needs identified from the Stage 3 tables. Each need was associated with a Dataset, and was identified as being a Functional requirement or a Non-functional requirement. The data from the Need table (and from the tables of Stage 3) was then used to define and fill-in the tables for the Datasets and the Requirements. Finally, in Stage 5, the data was categorized according to the attributes of the "extended" OAIS Need concept developed at Stage 2 and according to the general categories of Audio, Video and Images.

To conclude this chapter and summarize the findings, two more tables were prepared, summarizing the Barriers and the Desired technologies in the three CoPs. The findings showed that the areas on which technology is desired are storage, streaming, preservation, digital asset management, high resolution. At the same time, technology to manage metadata, tools for rights management, and metadata schema were technical barriers for the CoPs.

Chapter 5

5. Findings, Conclusion and Recommendations

5.1 Introduction to chapter
This chapter provides the findings of the study. It presents the conclusions based on the facts and findings from analysis of data done in chapter 4. Some suggestions for further research are also mentioned.

5.3 Findings and Conclusion
The conclusion can be made by answering the research questions asked at the start of study. Those questions were:
- Is the Knowledge schema of Presto4U able to represent the needs of the Communities of Practice?
- Is there a requirement of any new class in the Knowledge schema?
- Are properties of the Need concept able to represent the requirements of AV communities?

5.3.1 Is the Knowledge schema of Presto4U able to represent the needs of Communities of Practice?
The CoP Knowledge schema is broad and covered most of the needs of the member organisations.

Association of Classes
- The schema seems to lack connection between Functional and Non-functional Requirements.
- The schema shows that a need can have many Functional requirements but there are cases when there is only one 'requirement' or even zero 'requirements'.
- There is no connection between dataset and functional requirements.
- Many 'Needs' may have many 'Datasets'.

One Dataset has many Needs - To prove it lets take some examples from the Need table in Appendix F (the label in parenthesis indicates the need).
Dataset Metadata
Needs
- Technology to manage metadata of all digital objects (R3_LTR_IuavUniv - need7)
- Technology to input user metadata flexibly (R5_LTR_ScreenArchive - need10)
- Better technology to access information through metadata and information representation (R2_LTR_OpenUniv - need18)

Dataset Storage
Needs
- Storage medium with large scale spinning disk system (R2_LTR_OpenUniv - need3)
- Need practical solutions for Ingest, processing output and a digital carrier that can be guaranteed to last for hundreds of years (R5_LTR_ScreenArchive - need9)
- Need software for long term storage (R11_PPVP_ENEX - need17)

One Need has many datasets - for example
Need
Need access to high quality images in archive (R9_PPVP_CCMA -need15)

Datasets
Image quality (R9_PPVP_CCMA -need15)
Common archive (R7_PPVP_Parallel40 -need13)
Fedora web (R2_LTR_OpenUniv - need4)
Digitization (R5_LTR_ScreenArchive - need11)

We can see the difference in the structure of the knowledge schema from the findings.

UML Representation of Actual and Refined CoP Knowledge Schema

We can see the difference in the structure of the knowledge schema from the findings. As discussed above based on the findings UML representation of CoP knowledge schema is shown both the actual and refined one.
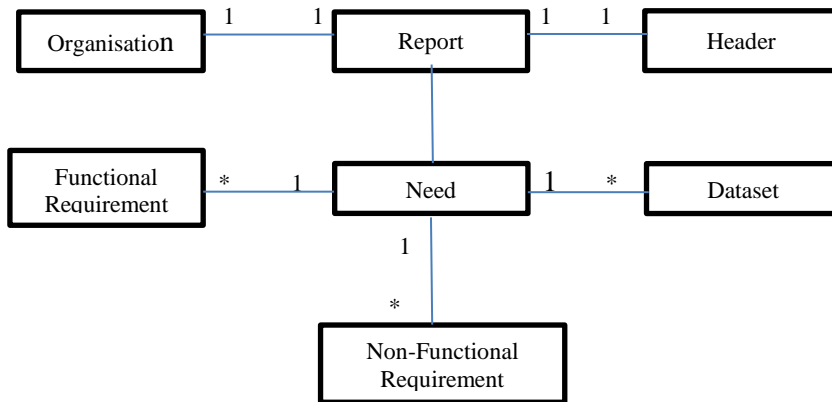
Figure 12: The Actual CoP Knowledge Schema
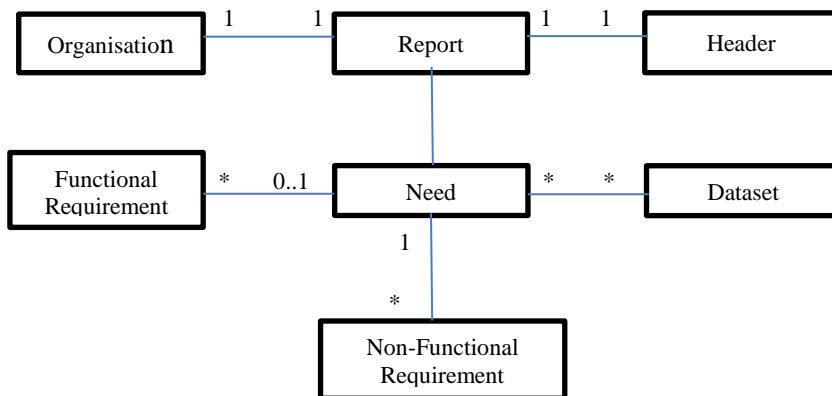
Figure 12: The Refined CoP Knowledge Schema

The study showed that:

o There may be a need without Functional requirement. That means that a Need may or may not have Functional requirements (following data shows this - R1_RSC_Scoula - need2; R2_LTR_OpenUniv - need4; R3_LTR_IuavUniv - need6, need7; R5_LTR_ScreenArchive - need9, need10; R7_PPVP_Parallel40 - need13; R8_PPVP_VETPostPT - need14; R10_PPVP_RTLNederland - need16; R11_PPVP_ENEX - need17; R2_LTR_OpenUniv - need18)

o There may be a Need without Non-functional requirement. That means that a Need may or may not have Non-functional requirements (following data proves it - R1_RSC_Scoula - need1; R2_LTR_OpenUniv - need3, need4, need5; R4_LTR_UnivDublin - need8; R8_PPVP_VETPostPT - need14; R11_PPVP_ENEX - need17)

o There may be cases where a Need has both Functional and Non Functional requirements. (It is confirmed through the following Needs from data - R2_LTR_OpenUniv - need4; R8_PPVP_VETPostPT - need14; R11_PPVP_ENEX - need17)

    o There may be cases where Need is without any Requirement (those case were - R5_LTR_ScreenArchive - need11, R6_LTR_InnsbruckUniv - need12, R9_PPVP_CCMA - need15)

5.3.2   Is there requirement of any new class in the knowledge schema?

Answer to this question could be found in the matching of the Questionnaire with the Knowledge schema. Matching of the Presto4U questionnaire with the Knowledge schema, i.e. with classes and their attributes has provided the following findings:

List of Questions in Questionnaire that likely do not have any place in the Knowledge Schema
The questions are provided with the same question number as it is in questionnaire (Appendix B). It should be consider that most of the questions listed below, will have numerical value as answers. The heading is the Section of the questionnaire.

Organisation
2.6 Size of the company or organisation?
2.7 Size of department?
2.8 Who is your target audience/customer?
2.9 CoP unit (department) operating budget (for year 2013/14)?

Collection
3.2 CoP unit collection size (Hours)?
3.3 CoP unit collection expected annual growth (Hours)?
3.4 What percentage of CoP unit's AV collections has been described, indexed or catalogued?
3.5 Does the CoP unit have a preservation programme for audio visual collections?
3.6 CoP unit analogue collection size (Hours)?
3.7 Analogue collection's annual growth (Hours)?
3.13 What is size of analogue conversion content within your organisation (Hours)?
3.14 What is expected annual growth rate of analogue-conversion content within your organisation (Hours)?
3.15 What is the size of born digital content within your organisation?
3.16 What is the expected annual growth rate of born-digital content within your organisation (Hours)?

Metadata
9.1 What is the relevance of standards for metadata in your institutions?

Rights Management
10.7 What is relevance of rights clearance to your organisation?

Exchange
12.11 How many times a week are you personally involved in transfer of media-files in cooperation with professionals outside your company?

List of questions missing in the Questionnaire that could fill properties of classes of the Knowledge Schema
During the matching process of the Questionnaire and the Knowledge schema it was found that questions related to some properties of the class Need could be asked. They are shown in the list below, where the headings are the sections in the Questionnaire (Appendix B) where they could fit.

4. Digitization
- Desired technology
- Barriers

- Requirements
- Involved datasets

5. Packaging
- Barriers
- Requirements

7. Ingestion
- Barriers
- Requirements

11. Access
- Barriers

In the class Need, another attribute named **Organisational Assets** (where values may be numeric) could be created to accommodate answers to the questions mentioned above.

5.3.3 Are properties of Need concept able to represent the requirements of AV communities?

The concept of Need expressed in the knowledge schema is able to capture the requirements of the Audio Visual community. All the attributes of the class Need (namely Need, Currently used technology, Reason for dissatisfaction, Desired technology, Barriers, Requirements) are very open, and so they can cover the data provided by the member organisations. But the Need should be better expressed through the OAIS reference model, as shown in the "extended" Concept Map described in Chapter 4, which categorise the many aspects of Need in terms of the OAIS functional units and sub-categories. It is our belief that the new Knowledge schema Tool (presently under development) and the use of the extended Concept Map could greatly facilitate the collection of needs and their analysis.

5.4 Suggestions for Further Research

The present study involved only three communities of practice only, so a study involving all the nine communities of practice of the Presto4U project could be considered, in order to better evaluate the knowledge schema's validity for all of these CoPs. As stated above, the use the new Knowledge schema Tool and of the extended Concept Map There could make a possible second round of data collection easier and more effective.

5.5 Chapter Summary

The study has concluded that a knowledge schema is very useful to express the needs of Communities of Practice, but it is important to collect data in such a way that they can easily fit into the structure of the knowledge schema. Some refinements of the questionnaire and also use of the new Knowledge schema Tool (under development) could be effective along with interviews get better results. The study has pointed out the need of a new attribute 'Organisational Asset' for the Class Need, to cover a variety of questions in expressing certain organisations and their needs. The concept of Need defined in the Knowledge schema is able to grasp the requirements of the audio visual community. All the attributes of Need class were very open, so they covered the data as provided by the member organisations. But the Need should be expressed through the OAIS reference model, as it was done in the defining the "extended" Concept Map of Need. Regarding the association of the classes it was found that many 'Needs' may have many 'Datasets'; a Need can have many Functional requirements, but there are cases when there is only one 'requirement' or even zero 'requirements'. Further research with all the nine Communities of Practice could be done by using more effective research tools.

A Brief Summary of Thesis

To have a quick grasp, a brief summary of the thesis is provided below:

Chapter 1 Summary

An overview of whole thesis in brief is provided through this chapter. So by now it is understood that this study is all about the digital audio-visual preservation. The rapidly increasing use of audio-visuals in the process of creation and storage of research data has created many issues regarding their maintenance, preservation and future accessibility. Lack of awareness about the preservation tools and applications is a big issue that is still not enough addressed among the research and scientific community. In this direction some initiatives have started like the Presto4U project that is trying to solve this issue. It will develop software that can semi automatically suggest the right preservation tool for any particular audio-visual (AV) need. The preservation need is being expressed formally using a knowledge schema represented through Unified Modelling Language. This attempts to contribute to the project by evaluating this schema for its adequacy to express the AV preservation need in terms of its classes, their associations and their vocabulary of class properties. The evaluation of the knowledge schema was performed within three Community of Practice: Research and scientific collections, Video production & post production and Learning and teaching repositories. Qualitative research approach was used for this evaluative study.

Chapter 2 Summary

By going through the whole chapter it is understood that the review of literature showed lot of projects on preservation talked about audio-visuals basics, tools, formats, storage, and access. Most of the projects dealing with preservation has opted OAIS reference model as their theoretical framework because it provides complete guide on how to preserve a digital document for long term. There are number of projects which has made and are still making tools to solve various preservation issues to summarise - DROID (Digital Record Object Identification) that performed automated batch identification of file formats; JHOVE provided automatic identification, validation and characterisation of a range of digital object types; COPTER ensures sharing knowledge about existing tools and their effectiveness instead of creating new tools; PANIC project aimed to develop a semi-automatic preservation service for scientific data for monitoring of archival collections, support decision making about preservation actions, and then invoke appropriate preservation service; KEEP aimed to enable automation of emulation (by rendering an obsolete object in the appropriate environment); and Planning tool Plato which enabled the automation of migration tools. Presto4U project now aimed to enable semi-automatic matching of preservation tools with audio-visual needs. To express the audio-visual needs formally it has mapped a knowledge schema using unified modeling language which has been evaluated through this study. As discussed in the chapter knowledge schema is has seven classes namely Header, Report, Organisation, Need, dataset, functional requirement and non-functional requirement.

Chapter 3 Summary

In this chapter we have presented an evaluative study, which involves the evaluation of the adequacy of a knowledge schema to formally represent the audio visual preservation needs (in the frame of the Presto4U project) by using qualitative research approach. Two different techniques are used, namely Interview and Questionnaire as data collection techniques. Interviews to collect data were chosen because of possible difficulties in filling the questionnaire, due to the many technical terms in it. Interviews and questionnaires from all fourteen members of the three Communities of Practice participating in the study were collected. The questionnaire, originally defined in the frame of the Presto4U project, was developed by keeping the OAIS model and Presto4U knowledge schema in mind. From the literature review it was found that the Digital Curation Centre (DCC) had used a "Data Asset Framework" (i.e. a set of methods, interviews and questionnaires) to collect issues related to technology, sharing and overall management in the use and storage of digital assets. The main limitations of this study were the non-complete involvement of all the nine CoPs of the Presto4U project, and the inability to use the knowledge schema to its full extent.

Chapter 4 Summary

The process of matching the questions of Questionnaire with the classes and properties of the Knowledge schema was carried out in Stage 0, by defining an Excel table (see Appendix C). A total of twenty one members belonging to three CoPs were invited to take part in the study, but only fourteen could be Interviewed and provided data about their needs. In Stage 1 the data from the questionnaires was filled-in in the table developed in Stage 0, where each subsequent column was corresponding to a questionnaire, and its entries were filled-in with values from the questionnaire, when available (see Appendix D). In Stage 2 the "Need" concept was extended and refined taking into account the OAIS reference model and the questions of the Questionnaire, in order to have a better understanding and categorisation about the needs expressed in the questionnaire data. In Stage 3 the data was filled-in in a new Excel table, where the rows were associated with the categories of the extended OAIS Need model and the columns were associated with some of the properties of the class "Need" of the Knowledge schema (see Appendix E). The problem at this stage was that in many cases the Functional and Non-functional requirements were not mentioned directly in the data, so they had to be found (applying some judgement) in the other data related to Need.

The next stage was Stage 4 that dealt with specifying the consolidated data into knowledge schema (Classes Need, Dataset, Functional requirement, and Non-functional requirement with all properties). At this stage only eleven organizations were considered, as the others had not expressed any need in their answers. In this Stage seven tables were built, one for each class of the Knowledge schema. The first one to be built was the Need table, consolidating data from the 13 tables built at Stage 3. In this table, the rows were associated with the main properties of Need, and the columns were associated with the 18 needs identified from the Stage 3 tables. Each need was associated with a Dataset, and was identified as being a Functional requirement or a Non-functional requirement. The data from the Need table (and from the tables of Stage 3) was then used to define and fill-in the tables for the Datasets and the Requirements. Finally, in Stage 5, the data was categorized according to the attributes of the "extended" OAIS Need concept developed at Stage 2 and according to the general categories of Audio, Video and Images.

To conclude this chapter and summarize the findings, two more tables were prepared, summarizing the Barriers and the Desired technologies in the three CoPs. The findings showed that the areas on which technology is desired are storage, streaming, preservation, digital asset management, high resolution. At the same time, technology to manage metadata, tools for rights management, and metadata schema were technical barriers for the CoPs.

Chapter 5 Summary

The study has concluded that a knowledge schema is very useful to express the needs of Communities of Practice, but it is important to collect data in such a way that they can easily fit into the structure of the knowledge schema. Some refinements of the questionnaire and also use of the new Knowledge schema Tool (under development) could be effective along with interviews get better results. The study has pointed out the need of a new attribute 'Organisational Asset' for the Class Need, to cover a variety of questions in expressing certain organisations and their needs. The concept of Need defined in the Knowledge schema is able to grasp the requirements of the audio visual community. All the attributes of Need class were very open, so they covered the data as provided by the member organisations. But the Need should be expressed through the OAIS reference model, as it was done in the defining the "extended" Concept Map of Need. Regarding the association of the classes it was found that many 'Needs' may have many 'Datasets'; a Need can have many Functional requirements, but there are cases when there is only one 'requirement' or even zero 'requirements'. Further research with all the nine Communities of Practice could be done by using more effective research tools.

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Appendix A - Interview Material

Introduction to Interview

Introduce

I am Naresh Kumar and he is Fabrizio Falchi. He is Research and Scientific Collections Community of Practice leader at CNR- ISTI and I am a student writing my thesis at CNR-ISTI.

Research

We are working on "Preservation of digital Audio-visual material in different communities of practice", and contributing to "Presto4U", a European project (partially) funded by the European Commission in the frame of the FP7 program. The main aim of the project is to semi automatically achieve the matching of existing preservation tools with needs of audio visual applications in different communities of practice. So we want to know your preservation needs.

There is a questionnaires that needs to be filled in. we will fill in or assist you to fill in your responses in questionnaire during the interview.

Recording and Confidentiality

We would like to record our discussion for better analysis of the responses.

Thanks

We would like to thank you for agreeing to take part in this interview. We will share the results of the project with you as and when it gets ready.

Introductory Mail

Dear Presto4U Member,

The researcher is writing his thesis for the successful completion of International Master DILL (Digital Libraries Learning, http://dill.hioa.no/), which is a Master funded (until recently) by the European Program Erasmus Mundus.

Researcher is presently spending a period at ISTI, doing research for the completion of his Master Thesis on "Expressing Needs of Digital Audio-visual Applications in Different Communities of Practice for Long Term Preservation", and contributing to "Presto4U", a European project (partially) funded by the European Commission in the frame of the FP7 program.

To achieve above aim we are collecting audio-visual preservation needs (specifically in technical terms). So you are requested to please cooperate with us by providing all your organisation's preservation needs by filling the provided questionnaire.

We thank you for contributing to Presto4U project by giving all your time and effort.

With regards
Naresh Kumar
DILL (Digital Library Learning) Scholar
Presto4U, CNR-ISTI, Pisa.

Thanking Mail
We would like to thank you for contributing to Presto4U project by providing your organisation's preservation needs.
It was great experience to have discussion with you over audio-visual preservation needs & technology, and filling up questionnaires. We will work on your needs and try to find solutions.

Thanks again for everything.
With regards
Naresh Kumar
DILL (Digital Library Learning) Scholar
Presto4U, CNR-ISTI, Pisa

Consent for Interview

"Expressing Needs of Digital Audio-visual Applications in Different Communities of Practice for
Long Term Preservation"

I, _____ agree to be interviewed by Naresh Kumar (Digital Library Learning) for Presto4U project.
I understood that information collected during interview will be used for the Presto4U project. I agree and have no offence to participate in electronically recorded interviews online or face to face to contribute to this project.
I agree that any information acquired from this research may be used in any way for the best in the project.

_____   Date _____
Signature of Interviewee

Appendix B - Presto4U Official Questionnaire

Report [Number]

1. General Information

1.1 Interviewer /Author

1.2. Modality of interview - SELECT

Assisted interview
Autonomous
Skype-based
Other (please specify)

1.3. Occasion - SELECT

Conference
Project meeting
Online survey
Email
Other (please specify)

1.4. CoP name

Video and postproduction
TV, Radio and New Media Broadcasting
Music and Sound Archives
Film Collections and Film-makers
Video Art, Art Museums and Galleries
Footage Sales Libraries
Research and Scientific Collections
Learning and Teaching Repositories
Personal audio visual Collections

1.5. CoP members name(s)

1.6. Position

1.7. Company name

1.8. Name of department (CoP unit)

1.9. Date (DD-MM-YYYY)

1.10. Location (city and country)

1.11. Previous versions and dates DD-MM-YYYY) - If you fill this questionnaire in different stages, please indicate the dates

1.12. Notes - (Any annotation about the event)

2. Organisation

2.1. Type of organisation? - SELECT

Post production
Broadcaster
Production company
Media-house
Freelancer
Higher Education
Advertiser
Footage sales library
Museum
Restoration
In-house VP&PP
Other (please specify)

2.2. Mission - (Specify context, objectives)

2.3. Usage of media - Specify how the organisation uses the AV media (purpose and business)

2.4. To which sector does your company or organisation belong? - SELECT

Public
Commercial
Both - Public service (Public and commercial)
Other (please specify)

2.5. Position in the media lifecycle - SELECT

Content and archive management
Technical management
Sales and rights management
Distribution
Other (please specify)

2.6. Size of the company or organisation? - SELECT

< 10
10 to 50
50 to 100
> 100
> 1000
Other (please specify)

2.7 Size of department? - SELECT

< 5
10 to 20
20 to 50
50 to 100
Others

2.8 Who is your target audience/customer - Select as many as required

In-house PP
Production companies
Private consumers
General public
Public institutions
Broadcasters
Media-houses

Students /Teachers
Advertisers
Internet companies
Other (please specify)

2.9. CoP Unit (department) operating budget (for year 2013/14) - SELECT

< 10,000 euros
10,000 to 50,000 euros
> 50,000 euros
100,000 to 500,000 euros
> 500,000 euros

3. Collection

3.1. CoP Unit (department) Description of collection: Select as many as required

Film
Video
Audio

3.2. CoP Unit Collection size (Hours) - SELECT

> 1.000
1.000 to 10.000
10.000 to 25.000
25.000 to 50.000
50.000 to 100.000
> 100.000

3.3 CoP Unit Collection expected annual growth (Hours) - SELECT

> 1.000
1.000 to 10.000
10.000 to 25.000
25.000 to 50.000
50.000 to 100.000
> 100.000

3.4 What percentage of CoP Unit's AV collections has been described, indexed or catalogued? - SELECT

< 10%
10 to 20 %
20 to 50 %
50 to 100 %
Other (please specify)

3.5. Does the CoP Unit have a preservation programme for audiovisual collections? SELECT

Yes
No

3.6. CoP Unit Analogue collection size (Hours) - SELECT - If not applicable please go to question 3.15

Zero
< 1.000
1.000 to 10.000
10.000 to 25.000
25.000 to 50.000
50.000 to 100.000
> 100.000

3.7. Analogue collection annual growth (Hours) - SELECT

Zero
< 500
>500
Other (please specify)

3.8. Does CoP Unit store analogue AV collections under climate-controlled conditions? - SELECT

Yes
No

3.9 General overview of major physical formats in the collection: SELECT

Film
Reel-to-reel
DAT
2"
Betacam
1"
U-Matic
MII
VHS
Digital betacam
Other (please specify)

3.10. Do you have any plans to digitize your analogue collection? - SELECT

Yes
No (go to question 3.12)

3.11. If yes, how are you going to carry out the digitization? SELECT

Using internal expertise and equipment
Outsource to vendor
Both

3.12 If no, what is preventing you from going ahead with a digitisation plan? Select as many as required

Legal issues
Funding issues
No skills available
No buying in from decision makers
No human resources
Other (please specify)

3.13. What is the size of analogue conversion content within your organisation - SELECT

< 1.000
1.000 to 10.000
10.000 to 25.000
25.000 to 50.000
50.000 to 100.000
> 100.000

3.14. What is the expected annual growth rate of analogue-conversion content within your organisation (Hours) SELECT

Zero
< 500
>500
Other (please specify)

3.15. What is the size of born-digital content within your organisation - SELECT

< 1.000
1.000 to 10.000
10.000 to 25.000
25.000 to 50.000
50.000 to 100.000
> 100.000

3.16 What is the expected annual growth rate of born-digital content within your organisation (Hours) SELECT

Zero
< 500

>500
Other (please specify)

4. Digitisation

4.1. What percentage of your collection has been digitised so far? SELECT

Zero
< 10%
< 50%
> 50%
100%

4.2. What physical formats have you digitised so far? SELECT

Film
Reel-to-reel
DAT
2"
Betacam
1"
U-Matic
MII
VHS
Digital betacam
Other (please specify)

4.3 What hardware did you use in the process (please specify)?

4.4 Please provide an overview of capture software tools used within your organisation

4.5. Have you outsourced any digitisation work to vendors? SELECT

No
Yes

4.6. If yes, please specify?

4.7. Is there any reason why the current technology or service is not satisfactory? SELECT

No
Yes (please specify)

4.8. [Tools] - If the material has been outsourced to vendors, how is the digitised material delivered? SELECT

DVD
CD
Portable USB
Firewire hard drive
LTO data tape
FTP
Other (please specify)

4.9 [Standards] - Have you followed any standard guidelines for digitization? SELECT

IASA (International Association of Sound and Audiovisual Archives)
Library of Congress
Internal guidelines
Other (please specify)

5. Packaging (SIP)

5.1 [Tools] - What type of formatting (or packaging) tools do you use? - Select as many as required

Media composer (Avid)
Final cut pro (Apple)
Premiere (Adobe)
Pro Tools
Logic Audio
Wave Lab
Audition (Adobe)
Other (please specify)

5.2. What is your chosen codec for your master audio files? Select as many as required

Linear Pulse Code Modulation (LPCM)
Pulse-density modulation (PDM)
Pulse-amplitude modulation (PAM)
Direct Stream Digital (DSD)
Other (please specify)

5.3. What is your chosen wrapper for your master audio files? Select as many as required

WAV
AIFF
BWF
MP3
FLAC
AAC
other (please specify)

5.4. [Standards] - What is your chosen codec for your master video files? (select as many as required)

MPEG-1
MPEG-2
MPEG-4
JPEG2000
AJA
AppleProRes
H264
Other (please specify)

5.5. [Standards] - What is your chosen wrapper for master video files? (select as many as required)

AVI (Windows)
MP4
FLV (Flash video)
MOV (Quick time)
VOB
ASF
MXF
Other (please specify)

5.6 [Tools] - What tool(s) do you use to perform error and integrity checks during digitisation?

None

5.7 [Tools] - Is there any reason why the current technology is not satisfactory? SELECT

No
Yes (please specify)

5.8 [Tools] - If no tools are currently used to perform error and integrity checks, is there any desired technology that could

satisfy this need? Please specify

5.9 [Tools] - Is there any specific dataset on which the need for software arise? - SELECT

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

5.10. [Standards] - Do you collect or embed any master generation metadata during digitisation? SELECT

Yes
No
5.11 [Standards] - If yes, do you follow any metadata schema? SELECT

Yes (please specify)

No
5.12 [Tools] - Do you use any particular software/database to collect metadata? SELECT

Yes (please specify)

No
6. Archival storage

6.1. [Tools] - Do you have long-term storage? - SELECT

Yes (Go to question 6.6)
No
6.2. [Tools] - If not, what is preventing you from buying one? - SELECT

Funding issues
Legal issues
Lack of compatibility with existing hardware
Need advice
No buying in from decision makers
Other (please specify)
6.3 [Tools] - Are you aware of any technology that could satisfy this need? Please specify - SELECT

Yes (please specify)

No
6.4 [Tools] What would be the requirements for archival storage technology within your organisation? - SELECT

File storage
File restore
File partial restore
Configurable ingest
Input stream storage
Output streaming
Multifile restore
File repair
File search
File/folder tagging
Manage automatic workflows
Integrity check
Calculate checksums on upload
Calculate checksums on download
Format migration

Other (please specify)

6.5. [Tools] - Is there any specific dataset on which the need for software arise? - SELECT

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

No

6.6. [Tools] - If yes, what format do you use for long-term storage? - SELECT

Analog
Digital

6.7 [Tools] - Which medium do you use for long-term storage? - SELECT

Computer tape
Hard disk
CD-R
DVD
Digital mass storage system
Cloud
Other (please specify)

6.8 [Standards] - Does the storage conforms to any national or international standard? - SELECT

Yes (please specify)

No

6.9. [Tools] - Is there any reason why the current technology is not satisfactory? - SELECT

No
Yes (please specify)

6.10. [Tools] Is there any other desired technology that could better satisfy this need for long-term storage?

(if yes, please specify)

6.11 What would be the main requirements for your long-term storage of choice?

File storage
File restore
File partial restore
Configurable ingest
Input stream storage
Output streaming
Multifile restore
File repair
File search
File/folder tagging
Manage automatic workflows
Integrity check
Calculate checksums on upload
Calculate checksums on download
Format migration
Other (please specify)

7. Ingestion

7.1 Do you use any validation software to confirm files ingested are uncorrupted and complete?

Yes
No [Go to question 7.5]

7.2 If yes, please specify.

7.3 If yes, what type of fixity checks does the software perform? (add as many as required)

Checksums
Cryptographic hash functions
Digital signatures
Other (please specify)

7.4 If validation software is used, is there any reason why the current technology is not satisfactory?

No
Yes (please specify)

7.5 If no validation software is used, is there any desired technology that could satisfy this need?

No
Yes (please specify)

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

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

7.7. Are there any other file version created at the point of ingestion? - SELECT

Yes

No (go to question 7.11)

7.8. If yes, please specify the formats

7.9 [Tools] If yes, what software/s do you use for file compression?

7.10. [Tools] Is there any reason why the current technology is not satisfactory? - SELECT

Yes (please specify)

None

7.11. [Tools] - Do you collect any technical or descriptive metadata at the point of ingestion (SIP)? - SELECT

Technical
Descriptive
Both
None [go to 7.13]

7.12 [Tools] If yes, how do you perform this task?

7.13. [Tools] Is there any other desired technology that could better satisfy this need ? Select

Yes

No

7.14. [Tools] if yes, please specify

7.15. [Tools] - Is there any specific dataset on which the need for technology arise?

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

8. Asset management

8.1 [Tools] - Do you have a DAM system or some other type of central repository to manage your AV content?

Yes
No (go to 8.3 and up to 8.6 and then 8.14)
8.2 [Tools] - If yes, please specify (and go to question 8.7)

8.3. [Tools] - If the answer is no, what is preventing your you from buying one? - SELECT

Funding issues
Lack of compatibility with existing hardware
Infrastructure does not support desired software
Legal issues
Need advice
No buying in from decision makers
Other (please specify)
8.4. [Tools] - Are you aware of any technology that could satisfy this need? - SELECT

Yes (please specify)

No
8.5. [Tools] - What would be the requirements for a DAM or MAM system to satisfy your organisation's needs?

8.6. [Tools] - Is there any specific dataset on which the need for technology arise? And go to question 8.14

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

8.7 .[Tools] - What type of system is it? - SELECT

Commercial platform (proprietory)
Open source
Other (please specify)
8.8. [Tools] - What type of functionalities does it offer? - Select as many as required

Ingestion
Cataloguing
Search of content
Storage of content
Retrieval of content
Distribution of content

Management of system performance
Management of statistics
Rights management
Revision control
Documentation of preservation process
Other (please specify)

8.9. [Standards] - Which software protocol does it use? - SELECT

OAIS
HTTP-REST
IIOP
Other (please specify)

8.10 [Standards] - Does the repository conform to any international or national standard? - SELECT

Yes (please specify)

No

8.11. [Tools] - Is there any reason why the current technology is not satisfactory for your asset management? - SELECT

Yes
No

8.12. [Tools] - If yes, please specify

8.13. [Tools] - Are you aware of any other technology that you would like to use to better satisfy this need ? - SELECT

Yes (please specify)

No

8.14. [Tools] - What type of user-interface does the system offer? - SELECT

None

8.15 [Tools] - Do you have a separate software tool to perform regular error-checking?

Yes (please specify)
No

8.16. [Tools] - Do you have a separate software tool to perform content retrieval? - SELECT

Yes (please specify)
No

9. Metadata

9.1 [Standards] - What is the relevance of standards for metadata in your institution?

9.2. [Standards] - Have you adopted any metadata standard? - SELECT

Yes
No

9.3. If no, are you planning to adopt any metadata standard? - SELECT

Yes
No

9.4. [Standards] - Which metadata standard have you adopted or planning to adopt? - SELECT

MARC21
DublinCore
METS
PREMIS
MuseumDat
W3C
EBUCore
Other (please specify)

9.5. [Tools] - Do you use any type of metadata management system?- SELECT

Yes
No [and go to 9.13]

9.6. [Tools] - If yes, please specify

9.7 [Standards] - Does the technology conform to any other international or national standard? - SELECT

Yes (please specify)

No

9.8. What type of metadata does it enables you to log? - Select as many as required

Technical
Descriptive
Administrative
Structural
Other (please specify)

9.9. [Tools] Is there any reason why the current technology is not satisfactory? - SELECT

Yes
No

9.10. [Tools] If yes, please specify

9.11. [Tools] - Are you aware of any other technology that could better satisfy this need ?

Yes (please specify)

No

9.12. [Tools] - Is there any specific dataset on which the need for (metadata management) technology arise?

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

9.13. [Tools] - What would be the requirements for an efficient metadata management system for your organisation?

(e.g. back up metadata to xml files, automated metadata validation, restore lost metadata, email status report, etc.)

9.14. [Tools] - What are the barriers preventing the adoption of technology for metadata management within your organisation? SELECT

Funding issues
Lack of compatibility with existing hardware
Infrastructure does not support desired software
Legal issues
Need advice

No buying in from decision makers

Other (please specify)

10. Rights management

10.1. [Tools] - Do you have a separate rights management system for handling audiovisual rights? - SELECT

Yes

No go to 10.4

10.2. [Tools] If yes, please specify

10.3. If yes, is there any reason why the current technology is not satisfactory?

Yes

No

10.4. If yes, please specify

10.5. [Tools] - What would be the requirements for rights technology within your organisation? Select as many as required

Handling contracts

Rights Clearance

Usage reporting

Other (please specify)

10.6. [Tools] - What are the barriers to the adoption of rights technology within your organisation? Select as many as required

Funding issues

Organisational concerns

Limited human resources

Buy in from decision makers

Concerns about integration with other legacy systems

No suitable tool available for our rights model

Limited expertise

Other (please specify)

10.7. [Tools] - What is the relevance of rights clearance to your organisation?

11. Access

11.1. [Tools] - Do you have any software tool to provide access to content? SELECT

Yes

No [go to 11.8]

11.2. [Tools] - If yes, please describe the tool

11.3. [Standards] - Does the tool conform to any national or international standards?

Yes (please specify)

No

11.4. [Tools] - What functionalities does the tool provide? - SELECT as many as required

Search of content

Retrieval of content

Format conversion
Web access
Other (please specify)

11.5. If you have online access to content, what file format do you use for streaming video and/or audio? [Select as many as required]

MOV (Quick time)
FLV (Adobe Flash)
WMV
H264
AVI
MP3
MP4
VQF
Other (please specify)

11.6. [Tools] - Is there any reason why the current technology is not satisfactory?

Yes
No

11.7. [Tools] - If yes, please specify

Yes (please specify)

11.8. [Tools] Are you aware of any other technology that could better satisfy the need for access? - SELECT

Yes (please specify)

No

11.9. [Tools] - Is there any specific dataset on which the need for access technology arise?

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

11.10. [Tools] - What would be the requirements for access technology within your organisation?

12. Exchange

12.1 How do you prefer to dispatch your media files? - SELECT

Physical carriers by courier
File by network
Both
Other (please specify)

12.2 How do you prefer to receive your media files? - SELECT

Physical carriers by courier
File by network
Both
Other (please specify)

12.3 If by file, what file transfer method do you prefer? - SELECT

Quicklink
FTP (File transfer protocol)
Newslink
JPEG2000
Cloud - Yousendit, dropbox, fileCatalyst etc.
Other (please specify)

12.4 What type of network connection do you have? - SELECT

Sometimes
DSL connection
ADSL connection
Fibre connection
Other (please specify)

12.5 Is metadata embedded in media files? - SELECT

Yes
No
Sometimes

12.6 If yes, which fields do you embed? - Please highlight your preferences

Title
Date

12.7 If no, which fields would you prefer embedded? - Please highlight your preferences

Title
Date

12.8 What format do you prefer when receiving media files? - SELECT

DV
MPEG2
MPEG4
AVI
MOV
Other (please specify)

12.9 What format do you prefer when delivering media files? - SELECT

DV
MPEG2
MPEG4
AVI
MOV
Other (please specify)

12.10 What is your chosen wrapper for master video files? SELECT

AVI (Windows)
MP4
FLV (Flash video)
MOV (Quick time)
VOB
ASF
MXF
Other (Please specify)

12.11 How many times a week are you personally involved in transfer of media-files in cooperation with professionals outside your company? - SELECT

0-10 times
10 to 50 times
> 50

13. Emerging needs

13.1. When evaluating news technologies, do you have any other specific wish for new software for your organisation?

13.2. What functionalities are needed from the new software?

13.3 [Tools] - Is there any specific dataset on which the need for technology arise?

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

13.4 When evaluating new technologies what are the main categories of barriers preventing or limiting the adoption in your organisation? - Select as many as required

Skills (new expertise and trained staff need to be acquired for adoption and implementation of new technology)
Financial
Infrastructure (lack of compatibility with existing hardware/software)
Legal (IP, copyright, rights constraints)
Infrastructure (software or hardware environment do not support new technology)
Risks (adoption of new technology implies new risks to deal with that must be assessed and managed)
Other (specify)

13.5. How do you perform searches when you are looking for technologies or software tools? - SELECT

Web search
Community newsletters
Word-of-mouth
Specialist magazines
Other (please specify)

13.6. How do you decide new investments in technology? - SELECT

We have our own budget and can decide autonomously
We need to provide proofs and get approval for our investment
Other (please specify)

13.7. How do you evaluate the financial viability of an investment? Select as many as required

We evaluate ROI (return on investment)
We look at time saving in the current preservation workflow
We look at cost reductions
Other (please specify)

13.8. Can you think of anything else that might improve efficiency in your company?

13.9. Finally - Do you have any questions or issues, that you would like to discuss? Please select and add comment

Equipment
Storage
Formatting tool
Archive
Copyright
Exchange
Preservation
Standards
Other (please specify)

Appendix C
Stage 0 - Matching of Questions of Questionnaire with Knowledge Schema Format -
(Description Available in Chapter 4)

Questions from Questionnaire	Properties of the Class "Header" (Knowledge Schema)
General Information	
Interviewer	Interviewer
Modelity of Interview	Modelity of Interview
Occasion	Occasion
Community of Practice Name	Community of Practice Name
Community of Practice Members Name	Community of Practice Members Name
Position	Position
Company Name	Organisation Name
Name of Department	Name of Department
Date	Date
Location	Location
Previous Versions & Dates	Previous Versions & Dates
Notes	Notes

Questions from Questionnaire	Properties of the Class "Organisation" (Knowledge Schema)
Type of Organisation	Position in economic space
Mission	Mission
Usage of Media	Usage of media
Sector company belongs to	Position in economic and political space
Position in Media Cycle	Position in media lifecycle
Size of Organisation	
Size of Department	
Target Audience/ Customers	
CoP Unit Operating Budget	
Collection	
CoP Unit Collection Description	Currently used technology
Collection Size	
Collection Annual Growth	
Collection percentage - catalogued	
Preservation Program	
Analogue collection size	
Analogue collection annual growth	
Is it Stored in Climate Conditions	Usage of media
Collection Physical formats	Usage of Technology
Plan to digitize Analog Collection	Desired technology
How digitizing collection	Currently used technology
Problem in digitization	Barriers
Size of Analog Conversion	
Annual growth of Analog conversion	
Size of Born Digital	
Expected Annual growth rate of Born digital content	

Questions from Questionnaire	Properties of the Class "Need" (Knowledge Schema)
Digitization	**Need**
Percentage of collection digitized	Currently used Technology
Physical format digitized	Currently used Technology
Hardware used	Currently used Technology
Software used	Currently used Technology
Digitization outsourced	Currently used Technology
Way to deliver digitized material	Currently used Technology
Standard for digitization	Currently used Technology
Current technology not satisfactory	Reason of Disatisfaction
	Desired Technology or Service
	Barriers
	Requirements
	Involved Datasets

Packaging (SIP)	Need
Formating tools used	Currently used Technology
Audio Codec	Currently used Technology
Audio Wrapper	Currently used Technology
Video Codec	Currently used Technology
Video Wrapper	Currently used Technology
Error & Integrity check tool	Currently used Technology
Current technology not satisfactory	Reason for Dissatisfaction
Desired technology for Error & Integrity check	Desired Technology
Dataset - Software need arise	Involved dataset
Metadata collection / embed	Currently used Technology
Metadata Schema	Currently used Technology
Software to Collect metadata	Currently used Technology
	Barriers
	Requirements
Archival Storage	**Need**
Long term Storage	Currently used Technology
If not, why not buying	Barriers
Any technology that satisfy	Desired Technology
Requirements of Archival storage	Requirements
Dataset on which need Arise	Involved Dataset
Long term storage format	Currently used Technology
Long term storage Medium	Currently used Technology
Storage standard	Currently used Technology
Current technology not satisfactory	Reason of Dissatisfaction
Desired technologyfor long term storage	Desired Technology
Main requirements for long term storage	Functional Requirements

Ingestion	Need
Use Validation Software	Currently used Technology
If yes, type of fixity check it perform	Currently used Technology
Current technology not satisfactory	Reason for Dissatisfaction
Any Desired technology	Desired technology
Need on specific dataset of software	Involved Dataset
Other file version created at Ingestion	Currently used Technology
Software use for file compression	Currently used Technology
Current technology not satisfactory	Reason for Dissatisfaction
Collect technical or descriptive metadata	Currently used Technology
How it is performed	Currently used Technology
Desired technology	Desired technology
Dataset on Need for technology arise	Involved Dataset
	Barriers
	Requirements
Asset Management	**Need**
DAM System	Currently used Technology
If No, why not buying	Barriers
Any satisfactory technology to meet need	Reason for Dissatisfaction
Requirements for DAM system	Requirements
Dataset on need for technology arise	Involved Dataset
Type of system	Currently used Technology
Type of functionalities it offer	Currently used Technology
Software Protocol	Currently used Technology
Repository has confere to standard	Currently used Technology
Current technology not satisfactory	Reason for Dissatisfaction
Any technology that satisfy need	Desired Technology
Type of Userface system offer	Currently used Technology
Separate tool for error checking	Currently used Technology
Separate tool for content retrieval	Currently used Technology

Metadata	Need
Metadata standard relevance	
Adopted Metadata standard	Currently used Technology
Plan to adopt metadata standard	Currently used Technology
Which Metadata adopted	Currently used Technology
Type of metadata management system Use	Currently used Technology
Technology conform to Standard	Currently used Technology
Metadata type it enable to log	Currently used Technology
Reason current technology not satisfactory	Reason for Dissatisfaction
Technology that satisfy Need	Desired Technology
Dataset on need for technolgy arise	Involved Dataset
Requirement for Metadata management	Requirements
Barriers to adopt matadata technology	Barriers
Rights Management	Need
Separate rights managemnt system	Currently used Technology
Current technology not satisfactory	Reason for Dissatisfaction
Requirements for rights technology	Requirements
Barriers to adopt rights technology	Barriers
Relavence of Rights clearance	
Access	Need
Tool to access content	Currently used Technology
Standard of tool	Currently used Technology
Functionalities tool provide	Currently used Technology
Format for streaming video/audio	Currently used Technology
Current technology not satisfactory	Reason for Dissatisfaction
Other technology satisfy need	Desired Technology
Dataset on need for access technology arise	Involved Dataset
Requirements for Access technology	Requirements
	Barriers

Exchange (Not for LTR CoP)	Need
Preference in dispatching media files	Currently used Technology
Preference in receiving media files	Currently used Technology
Preference file transfer method	Currently used Technology
Type of network connection	Currently used Technology

Metadata embeded in files	Currently used Technology
Metadata fields embed	Currently used Technology
Format preference in recieving files	Currently used Technology
Format preference in delivering files	Currently used Technology
Chosen wrapper for video	Currently used Technology
How many times involvement in transfer media files	
Emerging Needs	**Need**
In Evaluating New Technology -wish for new software	Desired Technology
New functionalities needed from software	Requirements
Dataset on need for technology arise	Involved Dataset
Barriers prevents to adopt new technology	Barriers
How search for new technology	
Decision on new tech.	
Evaluation strategy for finance for investment	
Any Issues, questions want to discuss	
Comments	

Questions from Questionnaire	Properties of Class "Dataset" (Knowledge Schema)
Involved Dataset	title
	Language
	Locator
	Contributor
	creator
	createDate
	location
	description
	keyword
	genre
	rating
	relation
	collection
	copyright
	policy
	publisher
	targetAudience
	fragment
	namedFragment
	frameSize
	compression
	duration
	format
	samplingRate
	frameRate
	averageBitRate
	numTracks

Questions from Questionnaire	Properties of Class "Functional Requirement" (Knowledge Schema)
	Functional Reuirement Belongs to
	actor
Requirements	description
	notesAndIssues
	normalCourseOfEvents
	alternativeCourses
	exceptions
	includes
	specialRequirements
	assumptions
	pre-conditions
	post-conditions
	Priority
	frequencyOfUse

Questions from Questionnaire	Properties of 'Non-Functional Requirement'		
Requirements			
	Quality in Use	effectiveness	
		efficiency	
		satisfaction	
			Usefulness
			Trust
			Pleasure
			Comfort
		freedom of risk	
			Economic Risk Mitigation
			health and safety risk mitigation
			Environmental risk mitigation
		context coverage	
			Context completeness
			Flexibility
	Internal and External	functional sutaibility	

	Quality		
			Functional completeness
			Functional correctness
			Functional appropriateness
		performance efficiency	
			Time Behavior
			Resource utilization
			Capacity
		compatibility	
			Co-existence
			Interoperability
		Usability	
			Appropriateness recognisability
			Learnability
			Operability
			User error protection
			User interface aesthetics
			Accessibility
		Reliability	
			Maturity
			Availability
			Fault tolerance
			Recoverability
		Security	
			Confidentiality
			Integrity
			Non-repudiation
			Accountability
			Authenticity
		Maintainability	
			Modularity
			Reusability
			Analysability
			Modifiability
			Testability
		Portability	
			Adaptibility
			Installability
			Replaceability

Appendix D
Stage 1 : Matching Questions of
Questionnaire with Knowledge Schema
Format with Data for Verification

Report Number	Community of Practice	Community of Practice Member Name
1	Research & Scientific Collections	Scoula Normale Superiore, Pisa
2	Learning and Teaching Repository	The Open University, Milton Keynes, UK
3	Learning and Teaching Repository	Iuav Univ. of Venice
4	Learning and Teaching Repository	Royal Irish Academy
5	Learning and Teaching Repository	University College Dublin
6	Learning and Teaching Repository	University of Rome
7	Learning and Teaching Repository	Screen Archive South East, Chichester, England
8	Learning and Teaching Repository	Univ. of Innsbruck, Austria
9	Post Production and Video Production	Parallel40, Barcelona, Spain
10	Post Production and Video Production	VET Post Production and Training, London UK
11	Post Production and Video Production	Library and Sales department, CCMA-Televisió de Catalunya, Barcelona, Spain
12	Post Production and Video Production	Documentation, RTL Nederland, Hilversum, Holland
13	Post Production and Video Production	Infostrada Creative Technology, CMI holding, Hilversum, Holland
14	Post Production and Video Production	ENEX, Luxembourg

Questions from Questionnaire	Properties of the Class "Header" (Knowledge Schema)						
General Information	Report Number	1	2	3	4	5	6
Interviewer	Interviewer						
Modelity of Interview	Modelity of Interview	Face to face	Skype	Skype	Skype	Skype	Skype
Occasion	Occasion	Project meeting	Excelspreadsheet	Online survey	Online survey	Online survey	E-mail
Community of Practice Name	Community of Practice Name	Research & Scientific Collections	Learning and Teaching Repository	Learning and Teaching Repository	Learning and Teaching Repository	Learning and Teaching Repository	Learning and Teaching Repository
Community of Practice Members Name	Community of Practice Members Name						
Position	Position						
Company Name	Organisation Name	Scoula Normale Superiore, Pisa	The Open University, Milton Keynes, UK	Iuav Univ. of Venice	Royal Irish Academy	University College Dublin	University of Rome
Name of Department	Name of Department						
Date	Date	26-02-2014					
Location	Location	Pisa	Pisa	Pisa	Pisa	Pisa	Pisa
Previous Versions & Dates	Previous Versions & Dates						
Notes	Notes						
	Note: the Name of members and related information is not mentioned due to Privacy Issues						

Questions from Questionnaire	Properties of the Class "Header" (Knowledge Schema)								
General Information	Report Number	7	8	9	10	11	12	13	14
Interviewer	Interviewer								
Modelity of Interview	Modelity of Interview	Skype	Skype	Skype	Skype	Skype	Skype	Skype	Skype
Occasion	Occasion	Online survey	Online survey						
Community of Practice Name	Community of Practice Name	Learning and Teaching Repository	Learning and Teaching Repository	Post Production and Video Production	Post Production and Video Production	Post Production and Video Production	Post Production and Video Production	Post Production and Video Production	Post Production and Video Production
Community of Practice Members Name	Community of Practice Members Name								
Position	Position								
Company Name	Organisation Name	Screen Archive South East, Chichester,	Univ. of Innsbruck, Austria	Parallel40, Barcelona, Spain	VET Post Production and Training, London	Library and Sales department, CCMA-Televisió de	Documentation, RTL Nederland, Hilversum, Holland	Infostrada Creative Technology, CMI holding, Hilversum, Holland	ENEX, Luxembourg
Name of Department	Name of Department								
Date	Date								
Location	Location	Pisa	Pisa	Pisa	Pisa	Pisa	Pisa		Pisa
Previous Versions & Dates	Previous Versions & Dates								
Notes	Notes								
	Note: the Name of members and related information is not mentioned due to Privacy Issues								

Questions from Questionnaire	Properties of the Class "Organisation" (Knowledge Schema)				
	Report Number	1	2	3	4
	Originated from	R1_RSC_Scoula	R2_LTR_OpenUniv	R3_LTR_IuavUniv	R4_LTR_RoyalIrisAcad
	Name of the organization	Scoula Normale Superiore, Pisa	The Open University, Milton Keynes, UK	Iuav Univ. of Venice, Italy	Digital Repository of Ireland at the Royal Irish Academy
Type of Organisation	Position in economic space	Higher education	Higher education	Higher education	Digital Repository
Mission	Mission	The formation of scholars, professionals and citizens with a wide cultural background and with a strong critical attitude.	To be open to people, places, methods and ideas. We promote educational opportunity and social justice by providing high-quality university education to all who wish to realise their ambitions and fulfil their potential. Through academic research, pedagogic innovation and collaborative partnership we seek to be a world leader in the design, content and delivery of supported open learning.	The mission of the Video library is specialized the collection on documentaries about architecture, planning, design, and to make available the AV materials to the users. Other mission of the Video library is preserving the AV materials produced by Iuav University through digitalizing them.	The Digital Repository of Ireland is a national trusted digital repository for Ireland's social and cultural data. The repository will link together and preserve both historical and contemporary data held by Irish institutions, providing a central internet access point and interactive multimedia tools. As a national e-infrastructure for the future of education and research in the humanities and social sciences, DRI will be available for use by the public, students and scholars.
Usage of Media	Usage of media		AV production for teaching and informal learning and promotion for General public, Students/Teachers	Collecting, screening AV media during lessons and seminars for education & research for Students/Teachers	The Digital Repository of Ireland makes audio-visual research and educational resources available for scholars, students and general public to see and use.
Sector company belongs to	Position in economic and political space	Public	Public	Public	Public
Position in Media Cycle	Position in media lifecycle	Content and archive management, Technical management	Content and archive management, Technical management, Sales and rights management, and Distribution	Content and archive management, Technical management	Content and archive management
Size of Organisation		> 1000	> 1000	>500	10 to 50
Size of Department		10 to 20	50 to100	< 5	10 to 20

Questions from Questionnaire	Properties of the Class "Organisation" (Knowledge Schema)					
	Report Number	5	6	7	8	9
	Originated from	R5_LTR_UnivDublin	R6_LTR_UnivRome	R7_LTR_ScreenArchive	R8_LTR_InnsbruckUniv	R9_PPVP_Parallel40
	Name of the organization	University College Dublin	University of Rome	Screen Archive South East, Chichester, England	Univ. of Innsbruck	Parallel40, Barcelona, Spain
Type of Organisation	Position in economic space	Higher education	Higher education	Regional Screen Archive	Higher education	Production company
Mission	Mission	To support a high quality educational experience and engage in research-led teaching and learning.	Develop e-learning material for university Dept.	To develop and maintain a public collection of moving images for the benefit of individuals and communities celebrate screen media as a social and cultural record and as an expression of artistic creativity preserve, document and promote screen media made in the South East of England….	Collect AV material to support research and education	Improve society through documentation
Usage of Media	Usage of media	To support education teaching and learning for Students/Teachers	for supporting research, e-learning, Sapienza digital library, and selling services to third parties	Education,Broadcast, DVDs, Web, local history, Exhibition, Museums and Art Galleries, Artist's projects, Film, Film Festivals for General public	Teaching students, lending service for Students/Teachers	For theatrical commercial and non-commercial use, television, internet, dvd
Sector company belongs to	Position in economic and political space	Public	Public	Public		Commercial
Position in Media Cycle	Position in media lifecycle	Content and archive management	Technical management	Content and archive management	Content and archive management	Content and archive management, Sales and rights management, Distribution
Size of Organisation		> 1000	> 1000	< 10	> 1000	10 to 50
Size of Department		< 5	10 to 20	< 5	< 5	10 to 20

Questions from Questionnaire	Properties of the Class "Organisation" (Knowledge Schema)				
	Report Number	10	11	12	13	14
	Originated from	R10_PPVP_VETPostPT	R11_PPVP_CCMA	R12_PPVP_RTLNederland	R13_PPVP_ICT_CMINederland	R14_PPVP_ENEX
	Name of the organization	VET Post Production and Training, London UK	Library and Sales department, CCMA- Televisió de Catalunya, Barcelona, Spain	Documentation, RTL Nederland, Hilversum, Holland	Infostrada Creative Technology, CMI holding, Hilversum, Holland	ENEX, Luxembourg
Type of Organisation	Position in economic space	Post-Production	Broadcaster	Broadcaster	Post production facilitator / Broadcast IT	News agency
Mission	Mission	Commercial and non-commercial post production facilities for TV Production,. Also a training provider.	In compliance with Parliamentaru mandate, CCMA's mission is to offer to all citizens of Catalonia quality and efficient public service broadcasting, committed to ethical and democratic principles while promoting the Catalan language and culture	Reuse of material, fact checking and documentation. Cultural obligation to the Dutch people.	Infostrada Creative Technology operates one of the largest audiovisual data centers in Europe. Its central infrastructure connects over 200 video editing sets, 5 audio post-production sets and 3 color grading sets via fiber-optic cabling. Furthermore Infostrada has an online storage capacity of 750 terabytes and archive storage of 2 petabytes.	Sharing resources, exchanging, coordination platform. Establish relations between medias.
Usage of Media	Usage of media	We assist clients creatively and technically to produce and deliver video content for all platforms: broadcast, web, corporate...	CCMA must work to reinforce the presence of Catalan audiovisual media throughout all Catalan-speaking territories. It must foster development in social and economic fields and work closely with the educational system. It must promote the development of the Catalan audiovisual industry and of audiovisual productions in Catalan. It must also provide an impetus for content employing new technologies and kinds of public communication such as Digital Radio, DTT, Internet, and mobile telephones.	Reuse of AV-material for everyone inhouse (journalists, external costomers/ Enex/ other broadcasters / postproduction and few students)	Content distribution, storage and archiving	Everyday News / 24 hours. EXEX holds totally 39 partners.
Sector company belongs to	Position in economic and political space	Commercial	Public	Commercial	Commercial	Commercial
Position in Media Cycle	Position in media lifecycle	Content and archive management,Technical management	Content and archive management, Technical management, Sales and rights management, Distribution	Content and archive management	Content and archive management, Technical management, Sales and rights management, Distribution	Content and archive management, Technical management, Distribution
Size of Organisation		10 to 50	> 1000	> 100	> 1000	> 100
Size of Department		< 5	20 to 50	< 5	50 to 100	10 to 20

	Report Number	1	2	3	4
	Originated from	R1_RSC_Scoula	R2_LTR_OpenUniv	R3_LTR_IuavUniv	R4_LTR_RoyalIrisAcad
Target Audience/ Customers		Public institutions and Teachers and student	Students/Teachers, General public	Students/Teachers	Higher Education Institutions, Broadcaster & General public
CoP Unit Operating Budget		< 10,000 euros		< 10,000 euros	> 500,000 euros
CoP Unit Collection Description	Currently used technology	Audio	Audio, Video & Film	Video	Audio, Video & Film
Collection Size		1.000 - 10.000 hours	10.000 to 25.000	1.000 - 10.000	< 1.000
Collection Annual Growth		< 1.000 hrs	< 1.000	< 1.000	< 1.000
Collection percentage - catalogued		50 to 100 %	50 to 100 %	50 to 100 %	50 to 100 %
Preservation Program		Yes	Yes	No	Yes
Analogue collection size		< 1.000	10.000 to 25.000	1.000 to 10.000	
Analogue collection annual growth			< 500	from 10 to 50	
Is it Stored in Climate Conditions	Usage of media		Yes	No	
Collection Physical formats	Usage of Technology	Reel-to-reel, DAT & MII	Film, Betacam, 1", 2", Umatic, Reel to reel, DAT, VHS, Digital betacam, DVD, audio cassette, Vinyl records	Betacam, 1", Umatic, DVD video & VHS	
Plan to digitize Analog Collection	Desired technology		Yes	Yes	
How digitizing collection	Currently used technology		Both	Using internal expertise and equipment	
Problem in digitization	Barriers				
Size of Analog Conversion			1.000 - 10.000	< 1.000	
Annual growth of Analog conversion			< 500	< 500	
Size of Born Digital				< 1.000	< 1.000
Expected Annual growth rate of Born digital content				< 500	< 500
	Note: the Label Above - R1_RSC_Scoula referes to Report 1 of Research and Scientific Collections community of practice and the member Scoula Normale	Note: Light Red color reperents questions from Questionnaire which do not fit to Knowledge schema or KS likely to not have place for them	Note: Light green color represents there are no questions in questionnaire that can fill particular property of class Need in Knowledge schema		

	Report Number	5	6	7	8	9
	Originated from	R5_LTR_UnivDublin	R6_LTR_UnivRome	R7_LTR_ScreenArchive	R8_LTR_InnsbruckUniv	R9_PPVP_Parallel40
Target Audience/ Customers		Students/Teachers	Public Institutions	General Public	Students/Teachers	Broadcasters, Production companies, Mediahouses, Internet companies
CoP Unit Operating Budget		< 10,000 euros	100,000 to 500,000 euros	100,000 to 500,000 euros	< 10,000 euros	> 500,000 euros
CoP Unit Collection Description	Currently used technology	Video	Video	Audio, Video & Film	Audio, Video	Video
Collection Size		1.000 - 10.000	< 1.000	1.000 - 10.000	1.000 - 10.000	< 1.000
Collection Annual Growth		< 1.000	< 1.000	< 1.000	< 1.000	< 1.000
Collection percentage - catalogued			20 to 50 %	10 to 20 %	100%	< 10%
Preservation Program			No	Yes	Yes	No
Analogue collection size		1.000 to 10.000	Zero	1.000 to 10.000	1.000 to 10.000	< 1.000
Analogue collection annual growth				< 500	Zero	< 500
Is it Stored in Climate Conditions	Usage of media			Yes	No	No
Collection Physical formats	Usage of Technology	VHS		Film, Betacam, Umatic, Reel to reel, VHS, Digital betacam, DVD, audio cassette, Vinyl records	VHS	
Plan to digitize Analog Collection	Desired technology	Yes		Yes	Already digitised	No
How digitizing collection	Currently used technology	Both		Using internal expertise and equipment		
Problem in digitization	Barriers					
Size of Analog Conversion				1.000 - 10.000	50.000 to 100.000	
Annual growth of Analog conversion				< 500	< 500	
Size of Born Digital		< 1.000	< 1.000	< 1.000	1.000 - 10.000	
Expected Annual growth rate of Born digital content		< 500	< 500	< 500	> 500	
	Note: the Label Above - R1_RSC_Scoula referes to Report 1 of Research and Scientific Collections community of practice and the member Scoula Normale					

	Report Number	10	11	12	13	14
	Originated from	R10_PPVP_VETPostPT	R11_PPVP_CCMA	R12_PPVP_RTLNederland	R13_PPVP_ICT_CMINederland	R14_PPVP_ENEX
Target Audience/ Customers		Broadcasters, Production companies, Advertisers	Broadcasters, Production companies, Private consumers, Advertisers, Internet companies	Broadcasters, Production companies	Broadcasters, Production companies, Private consumers, Mediahouses	Broadcasters
CoP Unit Operating Budget		< 10,000 euros			100,000 to 500,000 euros	
CoP Unit Collection Description	Currently used technology	Video	Video	Video	Video	Video
Collection Size		< 1.000	> 100.000	10.000 to 25.000	< 1.000	50.000 to 100.000
Collection Annual Growth		< 1.000	25.000 to 50.000	1.000 - 10.000	10.000 to 25.000	> 100.000
Collection percentage - catalogued		20 to 50 %	50 to 100 %	50 to 100 %	50 to 100 %	Zero
Preservation Program		Yes	Yes	No	Yes	No
Analogue collection size		< 1.000	50.000 to 100.000			
Analogue collection annual growth		Zero	Zero	Zero		Zero
Is it Stored in Climate Conditions	Usage of media	No	Yes	Yes		
Collection Physical formats	Usage of Technology	U-Matic, Betacam, VHS	U-Matic, Betacam	Betacam, VHS	Betacam, XD-Betacam	
Plan to digitize Analog Collection	Desired technology	Yes	Yes	No		
How digitizing collection	Currently used technology	Both	Using internal expertise and equipment			
Problem in digitization	Barriers	No human resources, Funding Issues, No Skills available				
Size of Analog Conversion		< 1.000	50.000 to 100.000			
Annual growth of Analog conversion		< 500	15			
Size of Born Digital		< 1.000	> 100.000	1.000 - 10.000		50.000 to 100.000
Expected Annual growth rate of Born digital content		> 500	15			> 100.000
	Note: the Label Above - R1_RSC_Scuola referes to Report 1 of Research and Scientific Collections community of practice and the member Scoula Normale					

Questions from Questionnaire	Properties of the Class "Need" (Knowledge Schema)					
	Report Number	1	2	3	4	5
	Need Belongs to	R1_RSC_Scuola	R2_LTR_OpenUniv	R3_LTR_IuavUniv	R4_LTR_RoyalIrisAcadmy	R5_LTR_UnivDublin
Digitization	**Need**					
Percentage of collection digitized	Currently used Technology		10% - 50%	< 10%	> 50%	0
Physical format digitized	Currently used Technology	Reel-to-reel, DAT & MII	Film, Betacam, 1", 2", Umatic, Reel to reel, DAT, VHS, Digital betacam, DVD, audio cassette, Vinyl records	Film, Betacam, 1", 2", Umatic, Reel to reel, DAT, VHS, Digital betacam, DVD, audio cassette, Vinyl records		
Hardware used	Currently used Technology		Outsourced 2 inch and 1 inch to external vendor. Outsourced D3 to external vendor. In-house - used Umatic players, Digibeta players, Conversion card for PC. Partial - not all items in each format have been digitised. Items are prioritised in accordance with selection criteria, including obsolescence of format, degradation of format, uniqueness of item (duplicates not held elsewhere) and items requested by archive users.	VTR Panasonic VHS- DVD rec IMAC 3.06 GHz i3 Analogic/digital converter pinnacle Movie Box Firewire		
Software used	Currently used Technology	DSP4 [izotope RX processing]	Audacity (audio), Adobe Premier Pro (video), Final Cut Pro	We use Final cut , adobe Premiere		
Digitization outsourced	Currently used Technology	No	Yes, 90%	No		
Way to deliver digitized material	Currently used Technology		Video flash file on hard drive, uncompressed .avi on hard drive,digibeta copy,DVD copy. Audio:.WAV and .MP3 delivered on hard dr			
Standard for digitization		IASA (International Association of Sound	We sought extensive external advice on digitisation formats and methods	IFLA Guidelines for Audiovisual and Multimedia Materials in Libraries and other Institutions; some reccomandatios form IASA		
Current technology not satisfactory	Reason of Disatisfaction	No	No	Unfortunatly we have old tools		
	Desired Technology or Service					
	Barriers					
	Requirements					
	Involved Datasets					

Questions from Questionnaire	Properties of the Class "Need" (Knowledge Schema)				
	Report Number	6	7	8	9
	Need Belongs to	R6_LTR_RomeUniv	R7_LTR_ScreenArchive	R8_LTR_InnsbruckUniv	R9_PPVP_Parallel40
Digitization	Need				
Percentage of collection digitized	Currently used Technology	100%	10% - 50%	100%	
Physical format digitized	Currently used Technology	Film, Betacam and DAT		VHS	
Hardware used	Currently used Technology		Macintosh, Projectors, Tape Decks, Capture Cards, Cameras, Scanners	Inhouse development of device	
Software used	Currently used Technology		Davinci Resolve, Final Cut Pro 7 and X, Avid, Premiere, Blackmagic Media Express, Soundtrack Pro, CatDV, Nuke,		
Digitization outsourced	Currently used Technology	No	Scanning, Telecine, Laboratory	No	
Way to deliver digitized material	Currently used Technology		Firewire hard drive		
Standard for digitization		Library of Congress	Internal guidelines	METS, Dublin Core	
Current technology not satisfactory	Reason of Disatisfaction	No	Price and availability of Scanners especially small gauge. Photochemical Laboratories, Film Stocks.	No	
	Desired Technology or Service				
	Barriers				
	Requirements				
	Involved Datasets				

Questions from Questionnaire	Properties of the Class "Need" (Knowledge Schema)					
	Report Number	10	11	12	13	14
	Need Belongs to	R10_PPVP_VETPostPT	R11_PPVP_CCMA	R12_PPVP_RTLNederland	R13_PPVP_ICT_CM INederland	R14_PPVP_ENEX
Digitization	Need					
Percentage of collection digitized	Currently used Technology	> 50%	> 50%	< 10%		
Physical format digitized	Currently used Technology	U-Matic, Betacam	Betacam, VHS, U-Matic	Betacam, XD-CAM		
Hardware used	Currently used Technology	Broadcast decks AJA and Blackmagic capture cards	Our own video transfer equipment: Flexicart. It's an automatic system that intakes Betacam tapes, analog or digital, connected with a software (MultiIngest) that governs on one hand the reproduction of tapes in VTR's (Flexicart), and on the other the digitalisation of video signals (DSXPlayRec) in PCs recording (PCIODOCXX). The flexicart is a device that can hold up to 30 small Betacam tapes and 4 VTR's. Then, through an internal arm is capable of loading / downloading tapes in VTR's. All this is controlled by an external software called MultiIngest, created in-house. Archive material with time codes are automatically treated " Digition is an audiovisual content management sistem (MAM)created in-house. Includes two different environments, Production and file with the same system of search and content management. Digital archive is the core both, of the production system and digital broadcasting."	N.A.		
Software used	Currently used Technology	Compressor, Avid MC, Final Cut		AVID	AVID, Centralparq	
Digitization outsourced	Currently used Technology	Film 1" and 1/2" video tapes	Partially, about 6000 oxid Betacam tapes to Sony Preservation Factory (France), in 2006-2007	No	No	
Way to deliver digitized material	Currently used Technology	eSata or UB3 hard drives	Firewire hard drive			
Standard for digitization				Adjusted "Sound and Vision"-standards		
Current technology not satisfactory	Reason of Disatisfaction	No	No	Search options are limited, but it works. Don't have the money to development. "You learn to manage"		
	Desired Technology or Service					
	Barriers					
	Requirements					
	Involved Datasets					

	Report Number	1	2	3	4	5
	Need Belongs to	R1_RSC_Scoula	R2_LTR_OpenUniv	R3_LTR_IuavUniv	R4_LTR_RoyalIrisAcadmy	R5_LTR_UnivDublin
Packaging (SIP)	**Need**					
Formating tools used	Currently used Technology		Final cut pro (Apple) Premiere (Adobe)	Final cut - main programme		Final Cut, Premiere (Adobe)
Audio Codec	Currently used Technology	Linear Pulse Code Modulation (LPCM)	Linear Pulse Code Modulation (LPCM)			Linear Pulse Code Modulation (LPCM)
Audio Wrapper	Currently used Technology	WAV	WAV	WAV		ACC
Video Codec	Currently used Technology			MPEG-4	MPEG-4, MPEG-2, H264	JPEG2000
Video Wrapper	Currently used Technology		AVI (Windows)	AVI (Windows), MOV (Quick time)		MOV (Quick time)
Error & Integrity check tool	Currently used Technology	JHOVE	External Companies			
Current technology not satisfactory	Reason for Dissatisfaction	No	No	No		No
Desired technology for Error & Integrity check	Desired Technology		No	No		
Dataset - Software need arise	Involved dataset		All video digitisation			
Metadata collection / embed		Yes	Yes	No		
Metadata Schema		No	we only use the file name to embed metadata			
Software to Collect metadata	Currently used Technology	No	JHOVE and FFMPEG used to extract technical metadata from video files (currently only access files are ingested to our system)			
	Barriers					
	Requirements					
Archival Storage	**Need**					
Long term Storage	Currently used Technology	Yes	Yes	Yes	Yes	Yes
If not, why not buying	Barriers	Funding				
Any technology that satisfy	Desired Technology					
Requirements of Archival storage	Requirements					
Dataset on which need Arise	Involved Dataset					
Long term storage format	Currently used Technology	Digital	Digital	Digital	Digital	Digital
Long term storage Medium	Currently used Technology		Hard disk, Computer tape	Hard disk	Digital mass storage system	Digital mass storage system
Storage standard		No		No	DRI storage is being developed according to ISO 16363 for Trusted Digital Repositories, and the Data Seal of Approval	TBC
Current technology not satisfactory	Reason of Dissatisfaction	No	Limited life span			No
Desired technologyfor long term storage	Desired Technology	Large Scale spinning disk system			More storage space.	

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	Report Number	6	7	8	9
	Need Belongs to	R6_LTR_RomeUniv	R7_LTR_ScreenArchive	R8_LTR_InnsbruckUniv	R9_PPVP_Parallel40
Packaging (SIP)	**Need**				
Formating tools used	Currently used Technology		Davinci Resolve	AviDemux	Media composer (Avid), Final cut pro (Apple)
Audio Codec	Currently used Technology		Linear Pulse Code Modulation (LPCM)	Linear Pulse Code Modulation (LPCM)	
Audio Wrapper	Currently used Technology	WAV	AIFF	WAV	
Video Codec	Currently used Technology	JPEG2000	AppleProRes	MPEG-4	
Video Wrapper	Currently used Technology		MOV (Quick time)	Mp4	
Error & Integrity check tool	Currently used Technology			encoder and OS built-in features and manual quality control	
Current technology not satisfactory	Reason for Dissatisfaction	No		No	
Desired technology for Error & Integrity check	Desired Technology		Don't know	-	
Dataset - Software need arise	Involved dataset	all the collections are catalogued by using an new application based on FEDORA	Embedding metadata, Creation of Master Archive Packages, Open source JPEG 2000	No, we are happy as it is.	
Metadata collection / embed		Yes	Yes	Yes	No
Metadata Schema		MODS, Dublin Core, EAD, METS	Technical metadata derived from Quicktime files, added metadata regarding catalogue data	METS, Dublin Core, DNX	
Software to Collect metadata	Currently used Technology	Based on FEDORA	CatDV, our own custom Filemaker Database with fields to collect basic technical metadata	Presto P4, eXist DB, custom built HTML Form with database connection	
	Barriers				
	Requirements				
Archival Storage	**Need**				
Long term Storage	Currently used Technology	Yes	Yes	Yes	Yes
If not, why not buying	Barriers				
Any technology that satisfy	Desired Technology				
Requirements of Archival storage	Requirements				
Dataset on which need Arise	Involved Dataset				
Long term storage format	Currently used Technology	Digital		Digital	
Long term storage Medium	Currently used Technology	Digital mass storage system	Hard disk	Computer tape	No
Storage standard		National rules related to digital preservation		IBM TSM	No
Current technology not satisfactory	Reason of Dissatisfaction	The long-term environment is still under development and will be completed next year	No guarantees of long term access	No	
Desired technologyfor long term storage	Desired Technology	The above questions do not describe our problems. Due to the lack of a digital storage medium with the long life of film and the problems associated with the need to re-capture our film masters as higher resolution capture become practical, we will need to keep our original films for the forseeable future. Thus capturing film images is only an access activity. Until scanning, processing and long term storage match the long life and high resolution of film this will continue to be the case.	No		

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	Report Number	10	11	12	13	14
	Need Belongs to	R10_PPVP_VETPostPT	R11_PPVP_CCMA	R12_PPVP_RTLNederland	R13_PPVP_ICT_CMINederland	R14_PPVP_ENEX
Packaging (SIP)	**Need**					
Formating tools used	Currently used Technology	Media composer (Avid), Final cut pro (Apple), Premiere (Adobe)	Media composer (Avid), Final cut pro (Apple)	Media composer (Avid)	Media composer (Avid)	
Audio Codec	Currently used Technology					
Audio Wrapper	Currently used Technology					
Video Codec	Currently used Technology	MPEG-4, JPEG2000, H264, AppleProRes	DVCPRO 25, DVCPRO50 and DVCPRO100 (HD)	MPEG-4		H264
Video Wrapper	Currently used Technology	MOV (Quick time), Mp4, MXF	AVI (Windows)	MXF	MXF	
Error & Integrity check tool	Currently used Technology	human eyechecksum	Inhouse tools	N.A.		None
Current technology not satisfactory	Reason for Dissatisfaction	No	No	No		No
Desired technology for Error & Integrity check	Desired Technology	more trained eyes, who can deduce the nature of problems from what they see / hear	No (please specify): We would like to improve quality control in digitalisation			
Dataset - Software need arise	Involved dataset	n/a				
Metadata collection / embed		Yes	Yes	Yes		No
Metadata Schema		our own - tailored to specific client	Specially developed by it-department	Adjusted "Sound and Vision" - standards		
Software to Collect metadata	Currently used Technology	DPP Metadata template; Excel; Cat DV;	Yes (please specify): Since 2007 broadcasting is completely digital. Digital born archive material incorporates all metadata gen	No	AVID Interplay	
	Barriers					
	Requirements					
Archival Storage	**Need**					
Long term Storage	Currently used Technology	Yes	Yes	Yes	Yes	No
If not, why not buying	Barriers					
Any technology that satisfy	Desired Technology					No
Requirements of Archival storage	Requirements					Visibillity of what is going on in the archive (ENEX only have a backup archive, no longterm storage). Wish for a monthly report about available space storage rack. Visibility of costs.
Dataset on which need Arise	Involved Dataset					
Long term storage format	Currently used Technology	Digital	Digital	Digital	Digital	
Long term storage Medium	Currently used Technology	LTO-5 standard	No	Dutch standards		
Storage standard		No	No	Don't have any money, so Vendor does'nt have to bother	No	
Current technology not satisfactory	Reason of Dissatisfaction		No - if department have a wishes for technology, they will ask It-development.	Yes, but it costs time and money, which we don't have		
Desired technologyfor long term storage	Desired Technology					

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	Report Number	1	2	3	4	5
	Need Belongs to	**R1_RSC_Scoula**	**R2_LTR_OpenUniv**	**R3_LTR_IuavUniv**	**R4_LTR_RoyalIrisAcadmy**	**R5_LTR_UnivDublin**
Main requirements for long term storage	Functional Requirements	File storage, File restore, File partiale restore, configurable ingest, Input stream storage, Output streaming, multifile restore, File repair & Format migration	File storage, File restore, Output streaming, Multifile restore, File search, File/folder tagging, Integrity check, Format migration, Calculate checksums on upload, Manage automatic workflows	File storage, File restore, Output streaming	File storage, Configurable ingest, File search, Calculate checksums on download, Calculate checksums on upload	File storage, File restore, Configurable ingest, Output streaming, File search, Integrity check, Format migration
Ingestion	**Need**					
Use Validation Software	Currently used Technology	No	Yes, Checksum doftware, FFMPEG		Yes, This will be in place for the repository but not yet selected	No
If yes, type of fixity check it perform	Currently used Technology		Checksums, Digital signatures		Checksums	
Current technology not satisfactory	Reason for Dissatisfaction		Configuration can be complex, output in XML would be preferred			
Any Desired technology	Desired technology					
Need on specific dataset of software	Involved Dataset		All digital archive materials			Yes, as many details as possible.
Other file version created at Ingestion	Currently used Technology	Access copies MP3- 128 kb Sterio/mono	Audio: MP3's created prior to ingest from .WAV. Video: .f4v, H264, OGV, WebM files created for ingest (master files not ingested due to size of uncompressed .AVI files)		Surrogate file is created at ingest	No
Software use for file compression	Currently used Technology	not known Audio Gra.Fo	File compression inbuilt within codecs for access versions (masters are uncompressed)		Not yet known	
Current technology not satisfactory	Reason for Dissatisfaction	No	No			
Collect technical or descriptive metadata			Both		Both	Both
How it is performed	Currently used Technology		JHOVE, FFMPEG other Unix tools, we also take descriptive metadata from exported database content (existing Library catalogue). N.B. System in development. Regularly reviewing tools in development		Not yet known	Finalcut Pro, xml (video); Adobe Bridge (photo
Desired technology	Desired technology					No
Dataset on Need for technology arise	Involved Dataset		No			
	Barriers					
	Requirements					
Asset Management	**Need**					
DAM System	Currently used Technology	Yes	Yes, Fedora - in development	No	Yes, Currently developing DRI Trusted Digital Repository based on Hydra-Fedora	Extensis Portfolio
If No, why not buying	Barriers			Funding issues		
Any satisfactory technology to meet need	Reason for Dissatisfaction					
Requirements for DAM system	Requirements					
Dataset on need for technology arise	Involved Dataset					
Type of system	Currently used Technology		Open source		Open source	Commercial platform (proprietory)
Type of functionalities it offer	Currently used Technology		Ingestion, Cataloguing, Search of content, Storage of content, Retrieval of content, Rights management, Revision control, Documentation of preservation process		Ingestion, Search of content, Storage of content, Retrieval of content, Distribution of content, Management of system performance, Rights management, Documentation of preservation process	Ingestion, cataloguing, Search of content, Storage of content, Retrieval of content, Distribution of content,

Appendix D

	Report Number	6	7	8	9
	Need Belongs to	**R6_LTR_RomeUniv**	**R7_LTR_ScreenArchive**	**R8_LTR_InnsbruckUniv**	**R9_PPVP_Parallel40**
Main requirements for long term storage	Functional Requirements	Configurable ingest	Guaranteed long life and High Speed access	File storage, File/folder tagging	
Ingestion	**Need**				
Use Validation Software	Currently used Technology	Yes		No	
If yes, type of fixity check it perform	Currently used Technology	Cryptographic hash functions			
Current technology not satisfactory	Reason for Dissatisfaction	the system is still under development			
Any Desired technology	Desired technology			No	
Need on specific dataset of software	Involved Dataset			-	
Other file version created at Ingestion	Currently used Technology	No		WebM access copy	
Software use for file compression	Currently used Technology			ffmpeg	
Current technology not satisfactory	Reason for Dissatisfaction			No	
Collect technical or descriptive metadata		Both	Technical	Both	
How it is performed	Currently used Technology	manually and automatically	Catdv	ffprobe for technical metadata extraction. Ingestion tool gathers metadata for the file ingested from the relational database	
Desired technology	Desired technology	No	Yes, More flexible input of user metadata. The ability to embed a variety of metadata sets into the digital file so that the digital object does not get separated from its contextual data	No	
Dataset on Need for technology arise	Involved Dataset				
	Barriers				
	Requirements				
Asset Management	**Need**				
DAM System	Currently used Technology	at the moment it is a responsibility of the consortium Cineca (public consortium for universities)		Yes, Presto4U	No
If No, why not buying	Barriers				
Any satisfactory technology to meet need	Reason for Dissatisfaction		Funding issues		No
Requirements for DAM system	Requirements		Access to high resolution copies for cataloguing, edit and access both internally and from remote sites so as to allow integration of the multi-media with the Archive's catalogue.		
Dataset on need for technology arise	Involved Dataset				
Type of system	Currently used Technology	Open source		Open source	
Type of functionalities it offer	Currently used Technology	Storage of content, Retrieval of content, Management of system performance, Revision control, Documentation of preservation process		Ingestion, Search of content	

Appendix D

	Report Number	10	11	12	13	14
	Need Belongs to	R10_PPVP_VETPostPT	R11_PPVP_CCMA	R12_PPVP_RTLNederland	R13_PPVP_ICT_CMINederland	R14_PPVP_ENEX
Main requirements for long term storage	Functional Requirements					
Ingestion	**Need**					
Use Validation Software	Currently used Technology					
If yes, type of fixity check it perform	Currently used Technology					
Current technology not satisfactory	Reason for Dissatisfaction					
Any Desired technology	Desired technology					
Need on specific dataset of software	Involved Dataset					
Other file version created at Ingestion	Currently used Technology	low res viewing file	Yes (please specify): high and low resolution of all ingested material			Creates a lowres copy.
Software use for file compression	Currently used Technology	Digital Rapids / Compressor /	High: software in-house MATROX AVI 2 waws / Low resolution IPV(SPECTREVIEW) mpeg1	AVID		Removes existing container and rewrap the material (MFX).
Current technology not satisfactory	Reason for Dissatisfaction	No	No	No		New software next year (2014)
Collect technical or descriptive metadata		Both	Both	Both		Descriptive
How it is performed	Currently used Technology	manually	Technical metadata are incorporated automatically by the system, metadata already existing are linked. Ingestion makes a previous ingesta, supervised by someone to detect errors. We add title and identification number	Central Ingest, special department		Descriptive metadata only when using Newslink. Besides that only email with metadata.
Desired technology	Desired technology					
Dataset on Need for technology arise	Involved Dataset		yes, everything except technical aspects			
	Barriers					
	Requirements					
Asset Management	**Need**					
DAM System	Currently used Technology	No	Yes, Flexicart	No		No
If No, why not buying	Barriers	Funding issues		Lack of money		Will get one next year (2014)
Any satisfactory technology to meet need	Reason for Dissatisfaction	ISIS; Interplay;		But we still don't have the money		We will choose a complete / All in one, open source product, that will connect with our other systems.
Requirements for DAM system	Requirements	Affordable, fast, cost efficient, robust interface for access / data entry etc				
Dataset on need for technology arise	Involved Dataset	Compatible with post production editing suites				
Type of system	Currently used Technology		Made in-house			
Type of functionalities it offer	Currently used Technology		Ingestion, Cataloguing, Search of content, Storage of content, Retrieval of content, Distribution of content, Management of system performance, Management of statistics			

	Report Number	1	2	3	4	5
	Need Belongs to	R1_RSC_Scuola	R2_LTR_OpenUniv	R3_LTR_IuavUniv	R4_LTR_RoyalIrisAcadmy	R5_LTR_UnivDublin
Software Protocol		OAIS	OAIS, HTTP-REST		OAIS	TBC
Repository has confere to standard			OAIS		Being developed in accordance with ISO 16363	TBC
Current technology not satisfactory	Reason for Dissatisfaction		No			Yes, Scalability issues and resources.
Any technology that satisfy need	Desired Technology					Institutional-level DAM.
Type of Userface system offer	Currently used Technology		Bespoke - in development			Desktop client and web browser access.
Separate tool for error checking	Currently used Technology		in development	No		No
Separate tool for content retrieval	Currently used Technology			No		No
Metadata	**Need**					
Metadata standard relevance		low linguistic Gra.Fo	We use metadata standards to ensure that data is compatible with other institutions and to maintain consistency and ensure best practice is used	The relevance of Metadata is very high in SBD "aresa" of Iuav University, concerning the different digital objets to preserve. About AV materials some years ago we adpted an Italian Medtadata schedule called MAG, but because we need a tool that can manage 4 level of rights, and MAG schedule manages just 2, that AV meterials Metadata project failed. MAG now it oboslete and we are going to adopt METS standards.	The Digital Repository will accept several different content and transmission metadata standards. This is based on the most prevalent standards in use by institutions across Ireland, who the DRI spoke to before building the repository. The DRI believes it is good practice to support metadata standards already in existence rather than creating a new one.	Standards under discussion.
Adopted Metadata standard		No	Yes	No	Yes	No
Plan to adopt metadata standard		Yes		Yes		Yes
Which Metadata adopted			MARC21, DublinCore, METS, PREMIS, W3C, EBUCore, VRA Core4, MODS, ISAD(G)/EAD, DC Collection, WARC, XCRI	METS	The Repository will currently accept MARC21, MODS, EAD, DublinCore and METS.	Dublin Core
Type of metadata management system Use	Currently used Technology	No	Multiple systems in use with Metadata standards. Principally Fedora, also Voyager Library Management System/Catalogue	No		No
Technology conform to Standard	Currently used Technology		OAIS (Fedora)			
Metadata type it enable to log	Currently used Technology		Technical, Descriptive, Administrative, Structural, Relationships, Permissions, Preservation			
Reason current technology not satisfactory	Reason for Dissatisfaction		Yes, RDF limitations within RELS-EXT (Fedora external relationships expressed as RDF (linked data)			
Technology that satisfy Need	Desired Technology		No			
Dataset on need for technolgy arise	Involved Dataset					
Requirement for Metadata management	Requirements		Multiple requirements - including examples given. Metadata harvesting, exporting, transformations of metadata to other standards, linked data capabilities e.g. triple stores, SPARQL queries, applications to enhance data with information from other linked-data sets		The ability to ingest multiple metadata formats and allow search across common/similar fields once ingested	To be agreed.
Barriers to adopt matadata technology	Barriers	Metadata schema	None	We are looking for the appropriate technology for managing the metadata of all kind of digital objects produced at Iuav.		
Rights Management	**Need**					

Appendix D

	Report Number	6	7	8	9
	Need Belongs to	**R6_LTR_RomeUniv**	**R7_LTR_ScreenArchive**	**R8_LTR_InnsbruckUniv**	**R9_PPVP_Parallel40**
Software Protocol		OAIS		HTTP-REST	
Repository has confere to standard		OAIS, ISO 16363 (under development), security ISO standards	Standards required by EU Screen, EIDR, and standards required to conform with the requirements of other projects	OAIS	
Current technology not satisfactory	Reason for Dissatisfaction	No	Yes, Lack of agreement on standards	No	
Any technology that satisfy need	Desired Technology	No		No	
Type of Userface system offer	Currently used Technology	CMS		P4 Admin interface & custom access interface for viewing	
Separate tool for error checking	Currently used Technology	I do not have at the moment the specific information required		IBM TSM	
Separate tool for content retrieval	Currently used Technology	No		FTP client	
Metadata	**Need**				
Metadata standard relevance		very high	Unclear. This seems to be an evolving issue and seems to have suddenly become a priority.	In our university as an institution the relevance is limited, in our department (digitisation) however it is higher;	
Adopted Metadata standard		Yes	Yes	Yes	
Plan to adopt metadata standard				METS	
Which Metadata adopted		MODS, Dublin Core, EAD, METS	Dublin Core	METS	
Type of metadata management system Use	Currently used Technology	Yes		Custom built solutions	
Technology conform to Standard	Currently used Technology	I do not remember		No	
Metadata type it enable to log	Currently used Technology		Administrative	Technical, Descriptive, Administrative, Structural	
Reason current technology not satisfactory	Reason for Dissatisfaction	No		No	
Technology that satisfy Need	Desired Technology				
Dataset on need for technolgy arise	Involved Dataset				
Requirement for Metadata management	Requirements				
Barriers to adopt matadata technology	Barriers			Funding	
Rights Management	**Need**				

Appendix D

	Report Number	10	11	12	13	14
	Need Belongs to	R10_PPVP_VETPostPT	R11_PPVP_CCMA	R12_PPVP_RTLNederland	R13_PPVP_ICT_CMINederland	R14_PPVP_ENEX
Software Protocol			HTTP-REST			
Repository has confere to standard			No			
Current technology not satisfactory	Reason for Dissatisfaction		No			
Any technology that satisfy need	Desired Technology					
Type of Userface system offer	Currently used Technology					
Separate tool for error checking	Currently used Technology					
Separate tool for content retrieval	Currently used Technology	No	No	No		No
Metadata	**Need**					
Metadata standard relevance		Relevant for us. Regarding provenance, and consistency with broadcasters / libraries etc Need to advise our clients re protocols for production	We haven't changed our standard for metadata.It's the same as when we worked in analogical system. It allows to export metadata in mxl files	Very important. If no metadata, no reuse.		Highly relevant
Adopted Metadata standard		No	No	Yes		No
Plan to adopt metadata standard		Yes	No			No
Which Metadata adopted		undecided - largely as we are a service supplier we will follow client requirements		Adjusted "Sound and vision" standards		
Type of metadata management system Use	Currently used Technology	No	No	No		Yes
Technology conform to Standard	Currently used Technology					No
Metadata type it enable to log	Currently used Technology					Technical, Descriptive, Administrative, Structural
Reason current technology not satisfactory	Reason for Dissatisfaction					No
Technology that satisfy Need	Desired Technology					
Dataset on need for technolgy arise	Involved Dataset	Descriptive, rights, Provenance				
Requirement for Metadata management	Requirements	enter data once all data follows through all re-processing stages automatically good access to search / find options (fuzzy etc)		It will take a whole day to discuss, but mostly it needs to be practical.		
Barriers to adopt matadata technology	Barriers	Funding issues		Lack of money		
Rights Management	**Need**					

Report Number		1	2	3	4	5
	Need Belongs to	R1_RSC_Scoula	R2_LTR_OpenUniv	R3_LTR_IuavUniv	R4_LTR_RoyalIrisAcadmy	R5_LTR_UnivDublin
Separate rights managemnt system	Currently used Technology	No	Yes, Outside CoP Unit - further questions in this section not answered as the system is outside the CoP Unit	No	No	No
Current technology not satisfactory	Reason for Dissatisfaction					
Requirements for rights technology	Requirements			Handling contracts, Rights Clearance		Rights Clearance, Usage reporting
Barriers to adopt rights technology	Barriers		No suitable tool available for our rights model			
Relavence of Rights clearance					DRI must permit or prevent access based on rights and licensing issues, but this can only be done in collaboration with the depositor.	Release forms.
Access	**Need**					
Tool to access content	Currently used Technology	website INTECS	Fedora web interface - in development	Cataloguing bibliographic software SOL - Sebina Open Library, part of SBN - Servizio Bibliotecario Nazionale. The software has specific fields for AV materials, according to the rules of GUIDA ALLA CATALOGAZIONE IN SBN. MATERIALE MODERNO .		Extensis Portfolio
Standard of tool		No	conforms to OAIS model	National standard REICAT, International standard ISBD consolidated edition, Unimarc on which is based protocol SBNmarc		Supports international metadata standards.
Functionalities tool provide	Currently used Technology	Search of content, Retrieval of content, Format conversion, Web access	Search of content, Retrieval of content, Format conversion, Web access	Retrieval of content, Opac SOL provides access to video contents but we need a Streaming server to make them available.		Search of content, Retrieval of content, Format conversion, Web access
Format for streaming video/audio	Currently used Technology	Mp3	FLV (Adobe Flash), H264, MP3, MP4			FLV (Adobe Flash), H264, MP3, MP4
Current technology not satisfactory	Reason for Dissatisfaction	No	need to produce several versions of access files to ensure accessibility by different browsers. Potentially, some access formats are proprietary	We need technology (hardware and software) for streaming the video.		No
Other technology satisfy need	Desired Technology		No		No	
Dataset on need for access technology arise	Involved Dataset					
Requirements for Access technolgy	Requirements		Content needs to be fully accessible to staff and students where appropriate			
	Barriers					
Exchange (Not for LTR CoP)	**Need**					
Preference in dispaching media files	Currently used Technology	File by network				
Preference in recieving media files	Currently used Technology	Analog				
Preference file transfer method	Currently used Technology					
Type of network connection	Currently used Technology					
Metadata embeded in files						

	Report Number	6	7	8	9
	Need Belongs to	**R6_LTR_RomeUniv**	**R7_LTR_ScreenArchive**	**R8_LTR_InnsbruckUniv**	**R9_PPVP_Parallel40**
Separate rights managemnt system	Currently used Technology	Yes, based on specific agreement between our repository and the national body SIAE which takes care of such issue		No	
Current technology not satisfactory	Reason for Dissatisfaction	No			
Requirements for rights technology	Requirements			Rights Clearance, Usage reporting	
Barriers to adopt rights technology	Barriers			No suitable tool available for our rights model, Limited human resources	
Relavence of Rights clearance		very high due to the types of the preserved material		Very relevant, as we are a public institution in posession of considerable quantities of material.	Rights management is not an issue, since rights are bought and transfered to customer
Access	**Need**				
Tool to access content	Currently used Technology	I do not have at the moment the specific information required		P4, custome interface	No
Standard of tool		It is based on the functional requirements established by the national legislation on accessibility		see above	
Functionalities tool provide	Currently used Technology	Search of content, Format conversion, Web access		Search of content, Retrieval of content, Web access	
Format for streaming video/audio	Currently used Technology		WMV, MP4	WEBM	
Current technology not satisfactory	Reason for Dissatisfaction	No	Every delivery platform requires different codecs, data rates and image size		
Other technology satisfy need	Desired Technology				
Dataset on need for access technology arise	Involved Dataset				
Requirements for Access technolgy	Requirements				
	Barriers				
Exchange (Not for LTR CoP)	**Need**				
Preference in dispaching media files	Currently used Technology				Physical carriers by courier
Preference in recieving media files	Currently used Technology				File by network
Preference file transfer method	Currently used Technology				Quicklink and cloud (yousendit)
Type of network connection	Currently used Technology				Fibre connection
Metadata embeded in files					No

	Report Number	10	11	12	13	14
	Need Belongs to	R10_PPVP_VETPostPT	R11_PPVP_CCMA	R12_PPVP_RTLNederland	R13_PPVP_ICT_CMINederland	R14_PPVP_ENEX
Separate rights managemnt system	Currently used Technology		In-house tools PROA for Production / Database in Acces for archive and the audiovisual content management			
Current technology not satisfactory	Reason for Dissatisfaction		For rights management of fragments incorporated in productions	No		No
Requirements for rights technology	Requirements		Handling contracts, Rights Clearance, Organisational concerns, Concerns about integration with other legacy systems	Rights Clearance		
Barriers to adopt rights technology	Barriers					
Relavence of Rights clearance		as far as it is relevant for our content -owning clients	Big issue	Highly relevant		
Access	**Need**					
Tool to access content	Currently used Technology	Cat DV	Yes (please specify): The system simplifies access to the images. It provides immediate viewing from computers and they can be used by multiple users	No		WEB
Standard of tool						
Functionalities tool provide	Currently used Technology	Search of content,Retrieval of content, Format conversion, Web access	Search of content,Retrieval of content, Format conversion, Web access			Search of content, Format conversion,
Format for streaming video/audio	Currently used Technology					
Current technology not satisfactory	Reason for Dissatisfaction	it develops and will get better, but a little 'clunky'	Yes (please specify): Access to offline reduced-quality copies of our footage in archive is immediate. Access to full-quality			We would like a new one. The existing software solution is a patchwork
Other technology satisfy need	Desired Technology	No	No			No
Dataset on need for access technology arise	Involved Dataset					
Requirements for Access technolgy	Requirements					
	Barriers					
Exchange (Not for LTR CoP)	**Need**					
Preference in dispaching media files	Currently used Technology	Both	Both	File by network		File by network
Preference in recieving media files	Currently used Technology	Both	Both	File by network		File by network
Preference file transfer method	Currently used Technology	Cloud - Yousendit, dropbox, fileCatalyst etc.	FTP (File transfer Protocol) and Cloud (Yousendit, dropbox, Filecatalyst etc.)	FTP and wetransfer		Newslink
Type of network connection	Currently used Technology	DSL connection	Fibre connection	Fibre connection		Fibre connection
Metadata embeded in files		Sometimes, Type, Subject, Format, Identifier, Source, Title	No	No		Yes, Title, Date, Creator

	Report Number	1	2	3	4	5
	Need Belongs to	**R1_RSC_Scoula**	**R2_LTR_OpenUniv**	**R3_LTR_IuavUniv**	**R4_LTR_RoyalIrisAcadmy**	**R5_LTR_UnivDublin**
Metadata fields embed						
Format preference in recieving files	Currently used Technology					
Format preference in delivering files	Currently used Technology					
Chosen wrapper for video	Currently used Technology					
How many times involvement in transfer media files						
Emerging Needs	**Need**					
In Evaluating New Technology - wish for new software	Desired Technology		Our Digital Archive is currently in development	A software/tool that can manage preservation and access (consultation) in a coordinated way. A software/tool that can produce the metadata records (with the technical, bibliographical and administrative information) at the moment of the production of the digital objects.		Not at this time.
New functionalities needed from software	Requirements					N/A
Dataset on need for technology arise	Involved Dataset					
Barriers prevents to adopt new technology	Barriers	Financial, Legal (IP, copyright, rights constraints)				
How search for new technology		Web search				
Decision on new tech.		We need to provide proofs and get approval for our investment				
Evaluation strategy for finance for investment		We look at time saving in the current preservation workflow	We need to provide proofs and get approval for our investment	We need to provide proofs and get approval for our investment	We need to provide proofs and get approval for our investment	We need to provide proofs and get approval for our investment
Any Issues, questions want to discuss			Equipments. We are preparing a workflow for AV materials in our University, from production to conservation. We would be that this "workflow" could be validated and adopted by our universitary community.	No		Standards
Comments				Other issues that we would like to discuss: Storage, Formating tools, Archive, Preservation, Standards.		Some questions refer to video only and not to photographic archives. Currently our photographic archive is well established with about 60% of our images digitised or born digital. However, most of or analogue video collection is not yet digitised, other then content born digital, which has yet to be archived in a searchable raid system. Also, there are a number of archives operating independently across the University. A central repository is under consideration, funding permitting.

	Report Number	6	7	8	9
	Need Belongs to	**R6_LTR_RomeUniv**	**R7_LTR_ScreenArchive**	**R8_LTR_InnsbruckUniv**	**R9_PPVP_Parallel40**
Metadata fields embed					
Format preference in recieving files	Currently used Technology				
Format preference in delivering files	Currently used Technology				MOV
Chosen wrapper for video	Currently used Technology				
How many times involvement in transfer media files					
Emerging Needs	**Need**				
In Evaluating New Technology - wish for new software	Desired Technology	no at the moment			Not an issue
New functionalities needed from software	Requirements	I do not have at the moment the specific information required		Annotation	
Dataset on need for technology arise	Involved Dataset				
Barriers prevents to adopt new technology	Barriers				Risks (adoption of new technology implies new risks to deal with that must be assessed and managed), Time and money
How search for new technology					
Decision on new tech.					We have our own budget and can decide autonomously
Evaluation strategy for finance for investment		We need to provide proofs and get approval for our investment	We have our own budget and can decide autonomously	We need to provide proofs and get approval for our investment	
Any Issues, questions want to discuss		Additional Staff and technical education in archival digitisation and preservation			Joan Gonzales / Parallel40 is very well aware - and to a great extent concerned - of the drop of cultural heritage, vanishing from smaller production companies like Parallel40. Joan Gonzales expresses great interest in tributing to a solution. Though it is difficult to find out what to do. Interested in some sort of joint venture / common archive, where smaller production companies like Parallel40 can upload rushes to a united arhcive (that be european or world wide). Parallel40 prefers to rent tools. Instead Parallel40 focuses on human beings and knowhow.
Comments			I have answered the majority of the questions to the best of my ability but the situation regarding online access and metadata is in such a state of flux that it is impossible to be specific without the risk of the information being more confusing than no answer.		

	Report Number	10	11	12	13	14
	Need Belongs to	**R10_PPVP_VETPostPT**	**R11_PPVP_CCMA**	**R12_PPVP_RTLNederland**	**R13_PPVP_ICT_CM INederland**	**R14_PPVP_ENEX**
Metadata fields embed			Title, Date, Description, Identifier, Rights		Title, Date, Rights	
Format preference in recieving files	Currently used Technology	High quality available source for a given programme	AVI, MOV	MPEG4		Depends. MXF, XD-cam, Newslink (MPEG4)
Format preference in delivering files	Currently used Technology	Nything / all. As per client / destination	AVI, MOV	MPEG4 and MOV		Want the ability to recieve and dispatch everything
Chosen wrapper for video	Currently used Technology	MXF	AVI, MOV	MP4		MFX (changes next year, 2014)
How many times involvement in transfer media files						
Emerging Needs	**Need**					
In Evaluating New Technology - wish for new software	Desired Technology		Quicker acces to high resolution media files / automatic check-up of ingested material	AVID is not growing enough, it's old. Waiting for update (3. year)		
New functionalities needed from software	Requirements			Rights / More search functionalities. No creativity. Wish for more investment in online software tools.		Statistics: How many watch an item, how do they watch it.
Dataset on need for technology arise	Involved Dataset	Agreement about datasets will be very welcome eg a UID standard would be great.				
Barriers prevents to adopt new technology	Barriers	Huge burden is R&D time to asess and then implement new solutions	Financial, Infrastructure (software or hardware environment do not support new technology)	Financial, Legal (IP, copyright, rights constraints), Infrastructure (software or hardware environment do not support new technology)		
How search for new technology						
Decision on new tech.		We have our own budget and can decide autonomously	We need to provide proofs and get approval for our investment	We need to provide proofs and get approval for our investment	N.A.	
Evaluation strategy for finance for investment						
Any Issues, questions want to discuss		automation logging more trained QC assessment technicians More people trained in the knowledge of end-to-end production	Changes in organisations concerns rather than tecnical ones to improve efficiency	We work as efficiently as we can, workload does'nt leave space for innovation.		
Comments		I may update this form before end of November. No further comments	Equipment, storage, formatting tool, archive, Copyright, Exchange, Preservation and standards. All subjects are interesting to us, to be up-to-date. Our system has been made in-house and we can keep adapting it and improving to new issues and needs that could appear in the future. It's a digital production and archive system and ensures preservation of images with the best possible quality and facilitates easy and permanent access to them	Longterm storage and Exchange		

Questions from Questionnaire	Properties of Class "Dataset" (Knowledge Schema)						
	Dataset Belong to	R1_RSC_Scoula	R2_LTR_OpenUniv	R7_LTR_ScreenArchive	R7_LTR_ScreenArchive	R7_LTR_ScreenArchive	R8_PPVP_VETPostPT
Involved Dataset	title	Gra.Fo	Digitisation	Storage	Metadata	Digitization	Digital_Asset
	language:	Italian	English	English	English	English	English
	locator:	Server/ Database	Equipments/Softwares/Server	Server/ Database/File	Database	Server/Tools	Server
	contributor:						
	creator:						
	createDate:						
	location:	Tuscany	Milton Keynes, UK	Chichester, England	Chichester, England	Chichester, England	London, UK
	description:						
	keyword:	Audio, Gra.Fo software, preservation	Video, Digital Archive Material, Archive	storage, video, Open Source	Metadata, user metadata, Embed	Archive Package, Digitization, small gauge scanners	Rights, Video, Post production
	genre:	Audio	Archive	Video	Metadata	Archive	Video
	rating:						
	relation:						
	collection:						
	copyright	Preservation, half Online, In-house Access					
	policy:						
	publisher:						
	targetAudience:	Researcher, students, teachers	Researcher, students, teachers	General public	General public	General public	Researcher, students, teachers
	fragment:						
	namedFragment:						
	frameSize:						
	compression:	PCM, WAV, 96k , 24 bit (Mono/Sterio)					
	duration	2800hrs					
	format	WAV					
	samplingRate	96					
	frameRate						
	averageBitRate	fixed, 96-24 bit					
	numTracks	102 audio					

Questions from Questionnaire	Properties of Class "Functional Requirement" (Knowledge Schema)				
	Functional Reuirement Belongs to	R1_RSC_Scoula	R2_LTR_OpenUniv	R2_LTR_OpenUniv	R7_LTR_ScreenArchive
	actor				
Requirements	description	Migration of collection with metadata is not possible, As member is not using any standard metadata schema	Content needs to be fully accessible to staff and students where appropriate	Multiple requirements - including examples given. Metadata harvesting, exporting, transformations of metadata to other standards, linked data capabilities e.g. triple stores, SPARQL queries, applications to enhance data with information from other linked-data sets	Access to high resolution copies for cataloguing, edit and access both internally and from remote sites so as to allow integration of the multi-media with the Archive's catalogue.
	notesAndIssues				
	normalCourseOfEvents				
	alternativeCourses				
	exceptions				
	includes				
	specialRequirements				
	assumptions				
	pre-conditions				
	post-conditions				
	priority				
	frequencyOfUse				

Questions from Questionnaire	**Properties of Class "Functional Requirement" (Knowledge Schema)**				
	Functional Reuirement Belongs to	**R7_LTR_ScreenArchive**	**R10_PPVP_VETPostPT**	**R10_PPVP_VETPostPT**	**R12_PPVP_RTLNederland**	**R14_PPVP_ENEX**
	actor				
Requirements	description	Guaranteed long life and High Speed access	Affordable, fast, cost efficient, robust interface for access / data entry etc	enter data once all data follows through all re-processing stages automatically good access to search / find options (fuzzy etc)	More search functionalities and creativity to access videos from online software tools from AVID.	The Functionalities of new software - Statistics: How many watch an item, how do they watch it.
	notesAndIssues				
	normalCourseOfEvents				
	alternativeCourses				
	exceptions				
	includes				
	specialRequirements				
	assumptions				
	pre-conditions				
	post-conditions				
	priority				
	frequencyOfUse				

Questions from Questionnaire	Non-Functional Requirement			R1_RSC_Scoula	R2_LTR_OpenUniv	R2_LTR_OpenUniv	R5_LTR_UnivDublin
Requirements	Non-Functional Requirement Belongs to			R1_RSC_Scoula	R2_LTR_OpenUniv	R2_LTR_OpenUniv	R5_LTR_UnivDublin
	Quality in Use	effectiveness					
		efficiency					
		satisfaction					
			Usefulness				
			Trust				
			Pleasure				
			Comfort				
		freedom of risk					
			Economic Risk Mitigation				
			health and safety risk mitigation				
			Environmental risk mitigation				
		context coverage					
			Context completeness				
			Flexibility	Flexibility			
	Internal and External Quality	functional sutaibility					
			Functional completeness				
			Functional correctness				
			Functional appropriateness				
		performance efficiency					
			Time Behavior				
			Resource utilization				
			Capacity		Capacity		

Questions from Questionnaire	**Non-Functional Requirement**			R1_RSC_Scoula	R2_LTR_OpenUniv	R2_LTR_OpenUniv	R5_LTR_UnivDublin
Requirements	**Non-Functional Requirement Belongs to**						
		compatibility					Compatibility
			Co-existence				
			Interoperability				
		Usability					
			Appropriateness recognizability				
			Learnability				
			Operability	Operability			
			User error protection				
			User interface aesthetics				
			Accessibility	Accessibility		Accessibility	Accessibility
		Reliability					
			Maturity				
			Availability				
			Fault tolerance				
			Recoverability				
		Security					
			Confidentiality				
			Integrity				
			Non-repudiation				
			Accountability				
			Authenticity				
		Maintainability					
			Modularity				
			Reusability				
			Analysability				
			Modifiability	Modifiability			
			Testability				
		Portability					
			Adaptibility				
			Installability				
			Replaceability				

Appendix E
Stage 3 : Presenting the data in class Need with its properties as 'Need' concept expressed in terms of OAIS Reference Model and Questionnaire

'Organisation' Table: Learning and Teaching Repository Community of Practice

Name of Member	Organisation					
	Mission	Position		Usage of Media	Usage of Technology	
		Media Cycle	Economic & Political		Hardware	Software
The Open Univ.	To be open to people, places, methods and ideas. We promote educational opportunity and social justice by providing high-quality university education to all who wish to realise their ambitions and fulfil their potential. Through academic research, pedagogic innovation and collaborative partnership we seek to be a world leader in the design, content and delivery of supported open learning.	Content and archive management, Technical management, Sales and rights management, and Distribution	Public	AV production for teaching and informal learning and promotion for General public, Students/Teachers	"Outsourced 2 inch and 1 inch to external vendor. Outsourced D3 to external vendor. In-house - used Umatic players, Digibeta players, Conversion card for PC. Partial - not all items in each format have been digitised. Items are prioritised in accordance with selection criteria, including obsolescence of format, degradation of format, uniqueness of item (duplicates not held elsewhere) and items requested by archive users."	Audacity (audio), Adobe Premier Pro (video), Final Cut Pro
Iuav Univ. of Venice	"The mission of the Video library is specialized the collection on documentaries about architecture, planning, design, and to make available the AV materials to the users. Other mission of the Video library is preserving the AV materials produced by Iuav University through digitalizing them."	Content and archive management and Technical management	Public	Collecting, screening AV media during lessons and seminars for education & research for Students/Teachers	"VTR Panasonic VHS- DVD rec IMAC 3.06 GHz i3 Analogic/digital converter pinnacle Movie Box Firewire"	We use Final cut , adobe Premiere
Royal Irish Academy	The Digital Repository of Ireland is a national trusted digital repository for Ireland's social and cultural data. The repository will link together and preserve both historical and contemporary data held by Irish institutions, providing a central internet access point and	Content and archive management	Public	The Digital Repository of Ireland makes audio-visual research and educational resources available for scholars, students and general public to see and use.		

	interactive multimedia tools. As a national e-infrastructure for the future of education and research in the humanities and social sciences, DRI will be available for use by the public, students and scholars.					
Univ. College Dublin	To support a high quality educational experience and engage in research-led teaching and learning.	Content and archive management	Public	To support education teaching and learning for Students/Teachers		
Univ. of Rome	Develop e-learning material for university Dept.	Technical management	Public	for supporting research, e-learning, Sapienza digital library, and selling services to third parties		
Screen Archive South East	To develop and maintain a public collection of moving images for the benefit of individuals and communities celebrate screen media as a social and cultural record and as an expression of artistic creativity preserve, document and promote screen media made in the South East of England….	Content and archive management	Public	Education,Broadcast, DVDs, Web, local history, Exhibition, Museums and Art Galleries, Artist's projects, Film, Film Festivals for General public	Macintosh, Projectors, Tape Decks, Capture Cards, Cameras, Scanners	Davinci Resolve, Final Cut Pro 7 and X, Avid, Premiere, Blackmagic Media Express, Soundtrack Pro, CatDV, Nuke,
Univ. of Innsbruck	Collect AV material to support research and education	Content and archive management	Public	Teaching students, lending service for Students/Teachers	Inhouse development of device	

Learning and Teaching Repository Community of Practice

Need Table - The Open University, Milton Keynes, United Kingdom

Category of Need			Involved Dataset	Currently Used Technology	Reason of Dissatisfaction	Desired Technology	Barriers	Requirements		
OAIS Steps	Sub Categories	'Need' Detail Category						Functional Requirements	Non Functi Requireme	
									Quality in Use	I/E Quality
Ingestion	Validation	Validation Software	FFMPEG	Checksum Software, FFMPEG	Configuration can be complex, output in XML would be preferred			Validation software FFMPEG during checksum or validation of files should make configuration easy and provide output in XML		
		Software Functions		Checksums, Digital signatures						
	Metadata Extraction	Metadata Collection		Descriptive and Technical metadata	No					
		Metadata Collection Software		JHOVE, FFMPEG other Unix tools, we also take descriptive metadata from exported database content (existing Library catalogue). N.B. System in development. Regularly reviewing tools in development		No				
	Agreement									
Archival Storage	Storage	Format		Analog and Digital				File storage, File restore, Output streaming, Multifile restore, File search, File/folder tagging, Integrity check, Format migration, Calculate checksums on upload, Manage automatic workflows		Performance efficiency - Capacity
		Medium	Storage	Computer tape, hard Disk, Digibeta	Limited life span	Large Scale spinning disk system				
		Standard								
	Migration									
	Metadata	Standard	Metadata	MARC21, DublinCore, METS, PREMIS, W3C, EBUCore, VRA Core4, MODS, ISAD(G)/EAD, DC Collection, WARC, XCRI				Multiple requirements - including examples given. Metadata harvesting, exporting, transformations of metadata to other standards, linked data		

Data Management								capabilities e.g. triple stores, SPARQL queries, applications to enhance data with information from other linked-data sets		
		Metadata Mgt. System		Multiple systems in use with Metadata standards. Principally Fedora, also Voyager Library Management System/Catalogue						
	Rights Management	Rights Mgt. System		Yes	RDF limitations within RELS-EXT (Fedora external relationships expressed as RDF (linked data)	No	None, we are adopting the technology (in development)			
Access	Processes	Software		Fedora web interface - in development	Need to produce several versions of access files to ensure accessibility by different browsers. Potentially, some access formats are proprietary	No				Usability - Accesibility
		Standard		Conforms to OAIS model						
		Tool Function		Search of content, Retrieval of content, Format conversion, Web access						
		Format		FLV, MP3, MP4, H264,						
	Services	Access to AV		Lending of analogue format, Production and delivery of digital files on request, Lending of digital format (DVD, CD etc.), On site viewing/listening via dedicated computer stations, University library online portal, U Tube, iTunes.				Content needs to be fully accessible to staff and students where appropriate		
Preservation Planning										
		Digital Asset		Fedora - in development						

Administration	Management	Management								
		System Type		Open source						
		Function Offered		Ingestion, Cataloguing, Search of content, Storage of content, Retrieval of content, Rights management, Revision control, Documentation of preservation process	No					
		Software Protocol		OAIS, HTTP-REST, IIOP						
		Standard		OAIS						
		Type of User Interface		Bespoke - in development						
	Producers									
	Consumers									
Digitization	Tool	Software								
		Standards		External Advice						
		Hardware		Outsourced 2 inch and 1 inch to external vendor. Outsourced D3 to external vendor. In-house - used Umatic players, Digibeta players, Conversion card for PC.	No					
Packaging (SIP)	Tool	Formatting Tool		Final cut pro (Apple) Premiere (Adobe)						
		Error & Integrity Checks Tool		External Companies	No	No				
	Codec & Wrapper	Audio Codec		Linear Pulse Code Modulation (LPCM)						
		Audio Wrapper		WAV						
		Video Codec								
		Video Wrapper		AVI (Windows)						
	Standard	Standards								

Need Table - Iuav University of Venice, Venice - Italy

Category of Need			Involved Dataset	Currently Used Technology	Reason of Dissatisfaction	Desired Technology	Barriers	Requirements		
OAIS Steps	Sub Categories	'Need' Detail Category						Functional	Non Functional	
									Quality in Use	Internal and External Quality
Ingestion	Validation	Validation Software								
		Software Functions								
	Metadata Extraction	Metadata Collection								
		Metadata Collection Software								
	Agreement									
Archival Storage	Storage	Format		Digital				File storage, File restore, Output streaming		
		Medium		Hard Disk						
		Standard		No						
	Migration									
Data Management	Metadata	Standard		No		METS	We are looking for the appropriate technology for Managing the metadata of all kind of digital objects produced at Iuav.			
		Metadata Mgt. System	Metadata	No						
	Rights Management	Rights Mgt. System					No suitable tool available for our rights model	Handling contracts, Rights Clearance		
Access	Processes	Software	Video_streaming	Cataloguing bibliographic software SOL - Sebina Open Library, part of SBN - Servizio Bibliotecario Nazionale. The software has specific fields for AV materials, according to the rules of GUIDA ALLA	We need technology (hardware and software) for streaming the video.	Need a Streaming server		OPAC SOL provides video content but we need streaming server to make them available and video streaming		

				CATALOGAZIONE IN SBN. MATERIALE MODERNO .						
		Standard		National standard REICAT, International standard ISBD consolidated edition, Unimarc on which is based protocol SBNmarc						
		Tool Function		Retrieval of content, Opac SOL provides access to video contents but we need a Streaming server to make them available.						
		Format								
	Services	Access to AV		Lending of analogue format, Lending of digital format (DVD, CD etc.), University library online portal, e-Learning platform		A software/tool to manage preservation and access (consultation) in a coordinated way. A software/tool that can produce the metadata records (with the technical, bibliographical and administrative information) at the moment of the production of the digital objects.		A software/tool that can produce the metadata records (with the technical, bibliographical and administrative information) at the moment of the production of the digital objects.		
Preservation Planning							Skills (new expertise and trained staff need to be acquired for adoption and implementation of			

								new technology), Financial,			
Administration	Management	Digital Asset Management		No			Funding issues				
		System Type									
		Function Offered									
		Software Protocol									
		Standard									
		Type of User Interface									
	Producers										
	Consumers										
Digitization		Software		We use Final cut , adobe Premiere	Unfortunately we have old tools						
		Standards		IFLA Guidelines for Audiovisual and Multimedia Materials in Libraries and other Institutions; some recommendations form IASA							
		Hardware		"VTR Panasonic VHS- DVD rec IMAC 3.06 GHz i3 Analogic/digital converter pinnacle Movie Box Firewire"							
Packaging (SIP)	Tool	Formatting Tool		Premiere (Adobe), Final cut - main programme	No	No					
		Error & Integrity Checks Tool		None							
	Codec & Wrapper	Audio Codec									
		Audio Wrapper		WAV							
		Video Codec		MPEG-2, MPEG-4, H264,							
		Video Wrapper		AVI (Windows), MOV (Quick time),							
	Standard	Standards									

Need Table - Digital Repository of Ireland at the Royal Irish Academy

	Category of Need		Involved Dataset	Currently Used Technology	Reason of Dissatisfaction	Desired Technology	Barriers	Requirements		
OAIS Steps	Sub Categories	'Need' Detail Category						Functional	Non Functional	
									Quality in Use	Internal & External Quality
Ingestion	Validation	Validation Software		This will be in place for the repository but not yet selected						
		Software Functions		Checksums,						
	Metadata Extraction	Metadata Collection		Technical and Descriptive				The ability to ingest multiple metadata formats and allow search across common/similar fields once ingested		
		Metadata Collection Software								
	Agreement									
Archival Storage	Storage	Format		Digital				File storage, Configurable ingest, File search, Calculate checksums on download, Calculate checksums on upload		
		Medium		Digital mass storage system						
		Standard		DRI storage is being developed according to ISO 16363 for Trusted Digital Repositories, and the Data Seal of Approval						
	Migration									
Data Management	Metadata	Standard		The Repository will currently accept MARC21, MODS, EAD, DublinCore and METS. This list will be expanded over time.						
		Metadata Mgt. System								
	Rights Management	Rights Mgt. System		No						
Access	Processes	Software		No		No				
		Standard								
		Tool Function								
		Format								

	Services	Access to AV		e-Learning platform							
Preservation Planning							Legal (IP, copyright, rights constraints), Financial				
Administration	Management	Digital Asset Management		Currently developing DRI Trusted Digital Repository based on Hydra-Fedora							
		System Type		Open source							
		Function Offered		Ingestion, Search of content, Storage of content, Retrieval of content, Distribution of content, Management of system performance, Rights management, Documentation of preservation process							
		Software Protocol		OAIS							
		Standard		Being developed in accordance with ISO 16363							
		Type of User Interface									
	Producers										
	Consumers										
Digitization		Software									
		Standards									
		Hardware									
Packaging (SIP)	Tool	Formatting Tool									
		Error & Integrity Checks Tool									
	Codec & Wrapper	Audio Codec									
		Audio Wrapper									
		Video Codec		MPEG-4							
		Video Wrapper									
	Standard	Standards									

Need Table - University College Dublin

Category of Need			Involved Data set	Currently Used Technology	Reason of Dissatisfaction	Desired Technology	Barriers	Requirements		
OAIS Steps	Sub Categories	'Need' Detail Category						Functional	Non Functional	
									Quality in Use	Internal & External Quality
Ingestion	Validation	Validation Software		No						
		Software Functions								
	Metadata Extraction	Metadata Collection		Descriptive and Technical	No					
		Metadata Collection Software		Finalcut Pro, xml (video); Adobe Bridge (photography).						
	Agreement									
Archival Storage	Storage	Format		Digital	No	More storage space.		More storage space.		
		Medium		Digital mass storage system						
		Standard		TBC						
	Migration			Format Migration						
Data Management	Metadata	Standard		No		Dublin Core	Funding	DublinCore		
		Metadata Mgt. System		No						
	Rights Management	Rights Mgt. System		No			Rights Clearance, Usage reporting, Funding issues	Rights Clearance, Usage reporting		
Access	Processes	Software		Extensis Portfolio	No					
		Standard		Supports international metadata standards.						
		Tool Function		Search of content, Retrieval of content, Format conversion, Web access						
		Format		FLV (Adobe Flash), H264, MP3, MP4						
	Services	Access to AV		Lending of analogue format, Production and delivery of digital files on request, Lending of digital format (DVD, CD etc.), On site viewing/listening via dedicated computer stations, University						

				library online portal, e-Learning platform						
Preservation Planning							Legal (IP, copyright, rights constraints), Financial, Risks (adoption of new technology implies new risks to deal with that must be assessed and managed)			
Administration	Management	Digital Asset Management	Digit al_as set	Extensis Portfolio	Scalability issues and resources.	Institutional-level DAM.				
		System Type		Commercial platform (proprietory)						
		Function Offered		Ingestion, cataloguing, Search of content, Storage of content, Retrieval of content, Distribution of content,						
		Software Protocol		TBC						
		Standard		TBC						
		Type of User Interface		Desktop client and web browser access.						
	Producers									
	Consumers									
Digitization		Software								
		Standards								
		Hardware								
Packaging (SIP)	Tool	Formatting Tool		Final cut pro (Apple)	No					
		Error & Integrity Checks Tool		No						
	Codec & Wrapper	Audio Codec		Linear Pulse Code Modulation (LPCM)						
		Audio Wrapper		AAC						
		Video Codec		JPEG2000						
		Video Wrapper		MOV (Quick time)						
	Standard	Standards								

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Need Table - University of Rome Sapienza

Category of Need			Involved Dataset	Currently Used Technology	Reason of Dissatisfaction	Desired Technology	Barriers	Requirements		
OAIS Steps	Sub Categories	'Need' Detail Category						Functional	Non Functional	
									Quality in Use	Internal and External Quality
Ingestion	Validation	Validation Software		Yes	the system is still under development					
		Software Functions		Cryptographic hash functions						
	Metadata Extraction	Metadata Collection		Technical and Descriptive	No					
		Metadata Collection Software		Based on FEDORA, manually and automatically						
	Agreement									
Archival Storage	Storage	Format		Digital	The long-term environment is still under development and will be completed next year			File storage, File restore, Configurable ingest, Output streaming, File search, Integrity check, Format migration		
		Medium		Digital mass storage						
		Standard		National rules related to digital preservation						
	Migration									
Data Management	Metadata	Standard		MODS, Dublin Core, EAD, METS	No					
		Metadata Mgt. System		Yes						
	Rights Management	Rights Mgt. System		based on specific agreement between our repository and the national body SIAE which takes care of such issues	No					
Access	Processes	Software		Yes	No					
		Standard		It is based on the functional requirements established by the national legislation on accessibility						
		Tool Function		Search of content, Format conversion, Web access						
		Format								
	Services	Access to AV		Production and delivery of digital files on request Lending of digital format (DVD, CD etc.), University library online portal, e-Learning platform						

Category	Subcategory	Item		Description						
Preservation Planning							Legal (IP, copyright, rights constraints), financial			
Administration	Management	Digital Asset Management		at the moment it is a responsibility of the consortium Cineca (public consortium for universities)	No	No				
		System Type		Open source						
		Function Offered		Storage of content, Retrieval of content, Management of system performance, Revision control, Documentation of preservation process						
		Software Protocol		OAIS						
		Standard		OAIS, ISO 16363 (under development), security ISO standards						
		Type of User Interface		CMS						
	Producers									
	Consumers									
Digitization		Software			No					
		Standards		Library of Congress						
		Hardware								
Packaging (SIP)	Tool	Formatting Tool			No					
		Error & Integrity Checks Tool								
	Codec & Wrapper	Audio Codec								
		Audio Wrapper		WAV						
		Video Codec		JPEG2000						
		Video Wrapper								
	Standard	Standards								

Need Table - Screen Archive South East, Chichester, England

OAIS Steps	Sub Categories	'Need' Detail Category	Involved Dataset	Currently Used Technology	Reason of Dissatisfaction	Desired Technology	Barriers	Functional	Quality in Use	Internal & External Quality
								Requirements		
								Functional	Non Functional	
									Quality in Use	Internal & External Quality
Ingestion	Validation	Validation Software		Yes				Configurable ingest. Access to high resolution copies for cataloguing, edit and access both internally and from remote sites so as to allow integration of the multi-media with the Archive's catalogue.		
		Software Functions								
	Metadata Extraction	Metadata Collection		Technical		More flexible input of user metadata. The ability to embed a variety of metadata sets into the digital file so that the digital object does not get separated from its contextual data				
		Metadata Collection Software	Metadata	CatDV, our own custom Filemaker Database with fields to collect basic technical metadata						
	Agreement									
Archival Storage	Storage	Format		Analog	No guarantees of long term access	Due to the lack of a digital storage medium with the long life of film and the problems associated with the need to re-capture our film masters as higher resolution capture become practical, we will need to keep our original films for the foreseeable future. Thus capturing film images is only an access activity. Until scanning, processing and long term storage match the long life and high resolution of film this will continue to be the case. The real need is for practical solutions for ingest, processing, output and a digital carrier that can be guaranteed to last for hundreds of years."				
		Medium	Storage	Hard Disk, Digital mass storage system						
		Standard								
	Migration									
Data	Metadata	Standard		Dublin Core, Technical metadata derived from Quicktime files, added metadata regarding catalogue data						

Management		Metadata Mgt. System								
	Rights Management	Rights Mgt. System								
Access	Processes	Software			Every delivery platform requires different codecs, data rates and image size					
		Standard								
		Tool Function								
		Format		MOV (Quick time), WMV, MP4						
	Services	Access to AV		Production and delivery of digital files on request, Lending of digital format (DVD, CD etc.)				Guaranteed long life and High Speed access		
Preservation Planning							Financial, Infrastructure (lack of compatibility with existing hardware/software), Legal (IP, copyright, rights constraints)			
Administration	Management	Digital Asset Management			Lack of agreement on standards		Funding Issues			
		System Type								
		Function Offered								
		Software Protocol								
		Standard		Standards required by EU Screen, EIDR, and standards required to conform with the requirements of other projects						
		Type of User Interface								
	Producers									

	Consumers									
Digitization		Software		Davinci Resolve, Final Cut Pro 7 and X, Avid, Premiere, Blackmagic Media Express, Soundtrack Pro, CatDV, Nuke	Price and availability of Scanners especially small gauge. Photochemical Laboratories, Film Stocks.					
		Standards		Internal guidelines						
		Hardware		Macintosh, Projectors, Tape Decks, Capture Cards, Cameras, Scanners						
Packaging (SIP)	Tool	Formatting Tool	Digitization	Embedding metadata, Creation of Master Archive Packages, Open source JPEG 2000	Media composer (Avid), Final cut pro (Apple), Davinci Resolve					
		Error & Integrity Checks Tool		None						
	Codec & Wrapper	Audio Codec		Linear Pulse Code Modulation (LPCM)						
		Audio Wrapper		AIFF						
		Video Codec		AppleProRes						
		Video Wrapper		MOV (Quick time)						
	Standard	Standards								

Need table - University Innsbruck, Innsbruck/Austria

Category of Need			Involved Dataset	Currently Used Technology	Reason of Dissatisfaction	Desired Technology	Barriers	Requirements		
OAIS Steps	Sub Categories	'Need' Detail Category						Functional	Non Functional	
									Quality in use	Internal & External Quality
Ingestion	Validation	Validation Software		No		No				
		Software Functions								
	Metadata Extraction	Metadata Collection		Technical, Descriptive, Administrative,Structural						
		Metadata Collection Software		ffprobe for technical metadata extraction. Ingestion tool gathers metadata for the file ingested from the relational database						
	Agreement									
Archival Storage	Storage	Format		Digital	No	No		File storage, File/folder tagging		
		Medium		Computer Tape						
		Standard		IBM TSM						
	Migration									
Data Management	Metadata	Standard		METS, Dublin Core, DNX	No					
		Metadata Mgt. System		Custom built solutions						
	Rights Management	Rights Mgt. System	Right_management	No			Limited human resources, No suitable tool available for our rights model	Rights Clearance, Usage reporting		
Access	Processes	Software		P4, custom interface						
		Standard		OAIS						
		Tool Function		Search of content, Retrieval of content, Web access				Annotation facility in Software		
		Format		WEBM						
	Services	Access to AV								

						Need software that have Annotation facility	Financial, Infrastructure (lack of compatibility with existing hardware/software)			
Preservation Planning										
Administration	Management	Digital Asset Management		Presto P4	No	No				
		System Type		Open Source						
		Function Offered		Ingestion, Search of content						
		Software Protocol		HTTP-REST						
		Standard		OAIS						
		Type of User Interface		P4 Admin interface & custom access interface for viewing						
	Producers									
	Consumers									
Digitization		Software - metadata collection		Presto P4, eXist DB, custom built HTML Form with database connection	No					
		Standards		METS, Dublin Core						
		Hardware		Inhouse development of device						
Packaging (SIP)	Tool	Formatting Tool		AviDemux	No					
		Error & Integrity Checks Tool		encoder and OS built-in features and manual quality control						
	Codec & Wrapper	Audio Codec		Linear Pulse Code Modulation (LPCM)						
		Audio Wrapper		WAV						
		Video Codec		MPEG-4						
		Video Wrapper		MP4						
	Standard	Standards								

Post Production and Video Production Community of Practice
Organisation table

| Name of Member | Organisation | | | | | |
| | Mission | Position | | Usage of Media | Usage of Technology | |
		Media Cycle	Economic & Political		Hardware	Software
Parallel40, Barcelona, Spain	Improve society through documentation	Content and archive management, Sales and rights management, Distribution	Commercial	For theatrical commercial and non-commercial use, television, internet, dvd		
VET Post Production and Training, London UK	Commercial and non-commercial post production facilities for TV Production,. Also a training provider.	Content and archive management,Technical management	Commercial	We assist clients creatively and technically to produce and deliver video content for all platforms: broadcast, web, corporate...	Broadcast decks AJA and Black magic capture cards	Compressor, Avid MC, Final Cut
Library and Sales department, CCMA-Televisió de Catalunya, Barcelona, Spain	In compliance with Parliamentaru mandate, CCMA's mission is to offer to all citizens of Catalonia quality and efficient public service broadcasting, committed to ethical and democratic principles while promoting the Catalan language and culture	Content and archive management, Technical management, Sales and rights management, Distribution	Public	CCMA must work to reinforce the presence of Catalan audiovisual media throughout all Catalan-speaking territories. It must foster development in social and economic fields and work closely with the educational system. It must promote the development of the Catalan audiovisual industry and of audiovisual productions in Catalan. It must also provide an impetus for content employing new technologies and kinds of public communication such as Digital Radio, DTT, Internet, and mobile telephones.	Our own video transfer equipment: Flexicart. It's an automatic system that intakes Betacam tapes, analog or digital, connected with a software (MultiIngest) that governs on one hand the reproduction of tapes in VTR's (Flexicart), and on the other the digitalisation of video signals (DSXPlayRec) in PCs recording (PCIODOCXX). The flexicart is a device that can hold up to 30 small Betacam tapes and 4 VTR's. Then, through an internal arm is capable of loading / downloading tapes in VTR's. All this is controlled by an external software called MultiIngest, created in-house. Archive material with time codes are automatically treated	Digitation is an audiovisual content management system (MAM)created in-house. Includes two different environments, Production and file with the same system of search and content management. Digital archive is the core both, of the production system and digital broadcasting.

Documentation, RTL Nederland, Hilversum, Holland	Reuse of material, fact checking and documentation. Cultural obligation to the Dutch people.	Content and archive management	Commercial	Reuse of AV-material for everyone inhouse (journalists, external costomers/ Enex/ other broadcasters / postproduction and few students)		AVID
Infostrada Creative Technology, CMI holding, Hilversum, Holland	Infostrada Creative Technology operates one of the largest audiovisual data centers in Europe. Its central infrastructure connects over 200 video editing sets, 5 audio post-production sets and 3 color grading sets via fiber-optic cabling. Furthermore Infostrada has an online storage capacity of 750 terabytes and archive storage of 2 petabytes.	Content and archive management, Technical management, Sales and rights management, Distribution	Commercial	Content distribution, storage and archiving		AVID, Centralparq
ENEX, Luxembourg	Sharing resources, exchanging, coordination platform. Establish relations between medias.	Content and archive management, Technical management, Distribution	Commercial	Everyday News / 24 hours. EXEX holds totally 39 partners.		

Need Table - Parallel40, Barcelona, Spain - Contains no Requirements

Category of Need			Involved Dataset	Currently Used Technology	Reason of Dissatisfaction	Desired Technology	Barriers
OAIS Steps	Sub Categories	'Need' Detail Category					
Ingestion	Validation	Validation Software		No			
		Software Functions					
	Metadata Extraction	Metadata Collection					
		Metadata Collection Software					
	Agreement						
Archival Storage	Storage	Format			No		
		Medium		Only storage in a box - most material is transfered to the customer			
		Standard		No			
	Migration	File Transfer method		Quick link and cloud (yousendit)			
		Format Receiving file					
		Format Delivering file		MOV			
Data Management	Metadata	Standard					
		Metadata Mgt. System					
	Rights Management	Rights Mgt. System					
Access	Processes	Software		No			
		Standard					
		Tool Function					
		Format					
	Services	Access to AV					
Preservation Planning				No preservation plan for Audio visual collection			Risks (adoption of new technology implies new risks to deal with that must be assessed and managed), Time and money
		Digital Asset Management		No		No	

Administration	Management	System Type					
		Function Offered					
		Software Protocol					
		Standard					
		Type of User Interface					
	Producers						
	Consumers						
Digitization		Software - metadata collection					Funding issues, No skills available, No buying in from decision makers, No human resources
		Standards					
		Hardware					
Packaging (SIP)	Tool	Formatting Tool		Media composer (Avid), Final cut pro (Apple)			
		Error & Integrity Checks Tool					
	Codec & Wrapper	Audio Codec					
		Audio Wrapper					
		Video Codec					
		Video Wrapper					
	Standard	Standards					

Need Table - VET Post Production and Training, London UK

Category of Need			Involved Dataset	Currently Used Technology	Reason of Dissatisfaction	Desired Technology	Barriers	Requirements		
OAIS Steps	Sub Categories	'Need' Detail Category						Functional	Non Functional	
									Quality in Use	Internal / External Quality
Ingestion	Validation	Validation Software								
		Software Functions								
	Metadata Extraction	Metadata Collection		Descriptive and technical metadata						
		Metadata Collection Software		DPP Metadata template; Excel; Cat DV;						
	Agreement									
Archival Storage	Storage	Format		Digital	No					
		Medium		Computer tape						
		Standard		LTO-5 standard						
	Migration	Transfer method		Cloud - Yousendit, dropbox, fileCatalyst etc.						
		Format Receiving file		High quality available source for a given programme						
		Format Delivering file		Anything / all. As per client / destination						
Data Management	Metadata	Standard		No		undecided - largely as we are a service supplier we will follow client requirements	Funding issues			
		Metadata Mgt. System	Descriptive rights provenance administrative metadata	No						
	Rights Management	Rights Mgt. System								
Access	Processes	Software		Cat DV	it develops and will get	No				

		Standard			better, but a little 'clunky'					
		Tool Function		Search of content, Retrieval of content, Format conversion, Web access				Affordable, fast, cost efficient, robust interface for access / data entry etc enter data once all data follows through all re-processing stages automatically good access to search / find options (fuzzy)		
		Format								
	Services	Access to AV								
Preservation Planning							Huge burden is R&D time to assess and then implement new solutions			
Administration	Management	Digital Asset Management	Digital_asset	Compatible with post production editing suites	No	ISIS; Interplay;	Funding Issues			
		System Type								
		Function Offered								
		Software Protocol								
		Standard								
		Type of User Interface								
	Producers									
	Consumers									
Digitization		Software - metadata collection		Compressor, Avid MC, Final Cut	No					
		Standards		our own - tailored to specific client						
		Hardware		"Broadcast decks AJA and Blackmagic capture cards"						
Packaging (SIP)	Tool	Formatting Tool		Media composer (Avid), Final cut pro (Apple), Premiere (Adobe)	No					
		Error & Integrity Checks Tool		human eye checksum						
	Codec & Wrapper	Video Codec		MPEG-4, JPEG2000, AppleProRes, H264						
		Video Wrapper		MOV (Quick time), MP4, MXF						
		Standards								
	Standard									

Need Table - Library and Sales department, CCMA- Televisió de Catalunya, Barcelona, Spain

Category of Need			Involved Dataset	Currently Used Technology	Reason of Dissatisfaction	Desired Technology	Barriers	Requirements		
OAIS Steps	Sub Categories	'Need' Detail Category						Functional	Non Functional	
									Quality in Use	Internal/ External Quality
Ingestion	Validation	Validation Software								
		Software Functions								
	Metadata Extraction	Metadata Collection		Technical metadata are incorporated automatically by the system, metadata already existing are linked. Ingestion makes a previous ingesta, supervised by someone to detect errors. We add title and identification number						
		Metadata Collection Software		Since 2007 broadcasting is completely digital. Digital born archive material incorporates all metadata gen						
	Agreement									
Archival Storage	Storage	Format		Digital	No	No - if department have a wishes for technology, they will ask IT-development.				
		Medium		Digital mass storage system						
		Standard		No						
	Migration	Transfer method		FTP (File transfer Protocol) and Cloud (Yousendit, dropbox, Filecatalyst etc.)						
		Format Receiving file		AVI, MOV						
		Format Delivering file		AVI, MOV						
	Metadata	Standard		Specially developed by IT-department						
		Metadata Mgt. System		No						

Data Management	Rights Management	Rights Mgt. System		In-house tools PROA for Production / Database in Access for archive and the audio visual content management	For rights management of fragments incorporated in productions			Handling contracts, Rights Clearance, Organisational concerns, Concerns about integration with other legacy systems		
Access	Processes	Software	Image_quality	The system simplifies access to the images. It provides immediate viewing from computers and they can be used by multiple users	Access to offline reduced-quality copies of our footage in archive is immediate. Access to full-quality	No				
		Standard								
		Tool Function		Search of content, Retrieval of content, Format conversion, Web access						
		Format								
	Services	Access to AV								
Preservation Planning					Changes in organisations concerns rather than technical ones to improve efficiency					
Administration	Management	Digital Asset Management		Flexicart	No					
		System Type		Made in-house						
		Function Offered		Ingestion, Cataloguing, Search of content, Storage of content, Retrieval of content, Distribution of content, Management of system performance, Management of statistics						
		Software Protocol		HTTP-REST						
		Standard		No						
		Type of User Interface								
	Producers									
	Consumers									

		Software		Digition is an audiovisual content management system (MAM) created in-house. Includes two different environments,Production and file with the same system of search and content management. Digital archive is the core both, of the production system and digital broadcasting.	No					
Digitization		Standards								
		Hardware		Our own video transfer equipment: Flexicart. It's an automatic system that intakes Betacam tapes, analog or digital, connected with a software (MultiIngest) that governs on one hand the reproduction of tapes in VTR's (Flexicart), and on the other the digitalisation of video signals (DSXPlayRec) in PCs recording (PCIODOCXX). The flexicart is a device that can hold up to 30 small Betacam tapes and 4 VTR's. Then, through an internal arm is capable of loading / downloading tapes in VTR's. All this is controlled by an external software called MultiIngest, created in-house. Archive material with time codes are automatically treated						
	Tool	Formatting Tool		Media composer (Avid), Final cut pro (Apple)	No	No We would like to improve quality control in digitasation				
		Error & Integrity Checks Tool		Inhouse tools						
Packaging (SIP)	Codec & Wrapper	Video Codec		DVCPRO 25, DVCPRO50 and DVCPRO100 (HD)						
		Video Wrapper		AVI (Windows)						
		Standards								
	Standard									

Need Table - Documentation, RTL Nederland, Hilversum, Holland

Category of Need			Involved Dataset	Currently Used Technology	Reason of Dissatisfaction	Desired Technology	Barriers	Requirements		
OAIS Steps	Sub Categories	'Need' Detail Category						Functional	Non Functional	
									Quality in Use	Internal / External Quality
Ingestion	Validation	Validation Software								
		Software Functions								
	Metadata Extraction	Metadata Collection		Descriptive and Technical						
		Metadata Collection Software		Central Ingest, Special Department						
	Agreement									
Archival Storage	Storage	Format		Digital	Don't have any money, so Vendor doesn't have to bother	Yes, but it costs time and money, which we don't have				
		Medium		Hard disk and Digital mass storage system						
		Standard		Dutch standards						
	Migration	Transfer method		FTP and wetransfer						
		Format Receiving file		MPEG4						
		Format Delivering file		MPEG4 and MOV						
Data Management	Metadata	Standard		Adjusted "Sound and Vision" - standards			Lack of Money			
		Metadata Mgt. System		No						
	Rights Management	Rights Mgt. System		No				Rights Clearance		
Access	Processes	Software		No						
		Standard								
		Tool Function						More search functionalities and creativity to access videos from online software tools from AVID.		
		Format								

	Services	Access to AV								
Preservation Planning							Financial, Legal (IP, copyright, rights constraints), Infrastructure (software or hardware environment do not support new technology)			
Administration	Management	Digital Asset Management		No		But we still don't have the money	Lack of money			
		System Type								
		Function Offered								
		Software Protocol								
		Standard								
		Type of User Interface								
	Producers									
	Consumers									
Digitization		Software	Search	AVID	Search options are limited, but it works. Don't have the money to development. "You learn to manage"					
		Standards								
		Hardware								
Packaging (SIP)	Tool	Formatting Tool		Media composer (Avid)	No					
		Error & Integrity Checks Tool								
	Codec & Wrapper	Video Codec		MPEG-4						
		Video Wrapper		MXF						
		Standards								
	Standard									

Need Table - Infostrada Creative Technology, CMI holding, Hilversum, Holland - Contains No Requirements

Category of Need			Involved Dataset	Currently Used Technology	Reason of Dissatisfaction	Desired Technology	Barriers
OAIS Steps	Sub Categories	'Need' Detail Category					
Ingestion	Validation	Validation Software					
		Software Functions					
	Metadata Extraction	Metadata Collection					
		Metadata Collection Software		AVID Interplay			
	Agreement						
Archival Storage	Storage	Format		Digital	No		
		Medium		Digital mass storage system			
		Standard					
	Migration	Transfer method					
		Format Receiving file					
		Format Delivering file					
Data Management	Metadata	Standard					
		Metadata Mgt. System					
	Rights Management	Rights Mgt. System					
Access	Processes	Software					
		Standard					
		Tool Function					
		Format					
	Services	Access to AV					
Preservation Planning							
Administration	Management	Digital Asset Management					
		System Type					
		Function Offered					
		Software Protocol					
		Standard					

		Type of User Interface					
	Producers						
	Consumers						
Digitization		Software		AVID, Centralparq			
		Standards					
		Hardware					
Packaging (SIP)	Tool	Formatting Tool		Media composer (Avid)			
		Error & Integrity Checks Tool					
	Codec & Wrapper	Video Codec					
		Video Wrapper		MXF			
		Standards					
	Standard						

Need Table - ENEX, Luxembourg

Category of Need			Involved Dataset	Currently Used Technology	Reason of Dissatisfaction	Desired Technology	Barriers	Requirements		
OAIS Steps	Sub Categories	'Need' Detail Category						Functional	Non Functional	
									Quality in Use	Internal / External Quality
Ingestion	Validation	Validation Software								
		Software Functions								
	Metadata Extraction	Metadata Collection		Descriptive, Technical and Structural	No					
		Metadata Collection Software		Descriptive metadata only when using Newslink. Besides that only email with metadata.						
	Agreement									
Archival Storage	Storage	Format	Archival_storage			"Visibillity of what is going on in the archive (ENEX only have a backup archive, no longterm storage). Wish for a monthly report about available space storage rack. Visibility of costs."		The Functionalities of new software - Statistics: How many watch an item, how do they watch it.		
		Medium								
		Standard								
	Migration	Transfer method		File by network, Newslink						
		Format Receiving file		Depends. MXF, XD-cam, Newslink (MPEG4)						
		Format Delivering file		Want the ability to recieve and dispatch everything						
Data Management	Metadata	Standard		No	No	No				
		Metadata Mgt. System		Yes, Only News link (which is a kind of management system)						
	Rights Management	Rights Mgt. System		No						
		Software		WEB	We would like a new one. The	No				
		Standard								

Access	Processes	Tool Function		Search of content, Format conversion	existing software solution is a patchwork			The Functionalities of new software - Statistics: How many watch an item, how do they watch it.		
		Format								
	Services	Access to AV								
Preservation Planning										
Administration	Management	Digital Asset Management		No		We will choose a complete / All in one, open source product, which will connect with our other systems.	Will get one this year (2014)			
		System Type								
		Function Offered								
		Software Protocol								
		Standard								
		Type of User Interface								
	Producers									
	Consumers									
Digitization		Software								
		Standards								
		Hardware								
Packaging (SIP)	Tool	Formatting Tool			No	No				
		Error & Integrity Checks Tool		None						
	Codec & Wrapper	Video Codec		H264						
		Video Wrapper		MFX (changes this year, 2014)						
		Standards								
	Standard									

Research and Scientific Collections Community of Practice
Organisation table

Name of Member	Organisation					
	Mission	Position		Usage of Media	Usage of Technology	
		Media Cycle	Economic & Political		Hardware	Software
Scuola Normale Superiore, Pisa, Italy		Content and archive management	Public	Research	MII, Reel to reel, DAT,	DSP4 [izotope RX processing], Gra. Fo

Need Table - Scuola Normale Superiore, Pisa, Italy

Category of Need			Involved Dataset	Currently Used Technology	Reason of Dissatisfaction	Desired Technology	Barriers	Requirements		
								Functional	Non Functional	
OAIS Steps	Sub Categories	'Need' Detail Category							Quality in Use	Internal/ External Qualities
Ingestion	Validation	Validation Software		No	No					
		Software Functions								
	Metadata Extraction	Metadata Collection								
		Metadata Collection Software								
	Agreement									
Archival Storage	Storage	Format		Digital	No			File storage, File restore, File partiale restore, configurable ingest, Input stream storage, Output streaming, multifile restore, File repair & Format migration		
		Medium		Digital mass storage system						
		Standard		No						
	Migration									
Data Management	Metadata	Standard		No			Metadata Schema	Migration of collection with metadata is not possible, As member is not using any standard metadata schema		
		Metadata Mgt. System		No						
	Rights Management	Rights Mgt. System		No						

Access	Processes	Software		Website INTECS	No				
		Standard		No					
		Tool Function		Search of content, Retrieval of content, Format conversion, Web access					
		Format							
	Services	Access to AV							
Preservation Planning							Financial, Legal (IP, copyright, rights constraints)		
Administration	Management	Digital Asset Management		Yes					
		System Type		Open source					
		Function Offered		Cataloguing, Search of content, Storage of content, Retrieval of content					
		Software Protocol		OAIS					
		Standard							
		Type of User Interface							
	Producers								
	Consumers								
Digitization		Software		DSP4 [izotope RX processing]	No				
		Standards		IASA (International Association of Sound and Audiovisual Archives)					
		Hardware							
Packaging (SIP)	Tool	Formatting Tool			No				
		Error & Integrity Checks Tool		JHOVE					
	Codec & Wrapper	Audio Codec		Linear Pulse Code Modulation (LPCM)					
		Audio Wrapper		WAV					
		Video Codec							
		Video Wrapper							
		Standards							
	Standard								

Appendix F

Stage 4 : Specifying the consolidated data into knowledge schema (Classes Need, Dataset, Functional requirement, and Non-functional requirement with all properties)

Report Number	Community of Practice	Community of Practice Member Name
1	Research & Scientific Collections	Scoula Normale Superiore, Pisa
2	Learning and Teaching Repository	The Open University, Milton Keynes, UK
3	Learning and Teaching Repository	Iuav Univ. of Venice
4	Learning and Teaching Repository	University College Dublin
5	Learning and Teaching Repository	Screen Archive South East, Chichester, England
6	Learning and Teaching Repository	Univ. of Innsbruck, Austria
7	Post Production and Video Production	Parallel40, Barcelona, Spain
8	Post Production and Video Production	VET Post Production and Training, London UK
9	Post Production and Video Production	Library and Sales department, CCMA- Televisió de Catalunya, Barcelona, Spain
10	Post Production and Video Production	Documentation, RTL Nederland, Hilversum, Holland
11	Post Production and Video Production	ENEX, Luxembourg

Properties of Class "Header" (Knowledge Schema)						
Report Number	**1**	**2**	**3**	**4**	**5**	**6**
Community of Practice	Research & Scientific Collections	Learning and Teaching Repository	Learning and Teaching Repository	Learning and Teaching Repository	Learning and Teaching Repository	Learning and Teaching Repository
Interviewer						
Organisation Name	Scoula Normale Superiore, Pisa	The Open University, Milton Keynes, UK	Iuav Univ. of Venice	University College Dublin	Screen Archive South East, Chichester, England	Univ. of Innsbruck, Austria
Date	26-02-2014					
Place	Pisa	Pisa	Pisa	Pisa	Pisa	Pisa
Form of Meeting	Face to face	Skype	Skype	Skype	Skype	Skype

Properties of Class "Header" (Knowledge Schema)					
Report Number	**7**	**8**	**9**	**10**	**11**
Community of Practice	Post Production and Video Production	Post Production and Video Production	Post Production and Video Production	Post Production and Video Production	Post Production and Video Production
Interviewer					
Organisation Name	Parallel40, Barcelona, Spain	VET Post Production and Training, London UK	Library and Sales department, CCMA-Televisió de Catalunya, Barcelona, Spain	Documentation, RTL Nederland, Hilversum, Holland	ENEX, Luxembourg
Date					
Place	Pisa	Pisa	Pisa	Pisa	Pisa
Form of Meeting	Skype	Skype	Skype	Skype	Skype

Properties of Class "Organisation" (Knowledge Schema)			
Report Number	**1**	**2**	**3**
Originated from	**R1_RSC_Scoula**	**R2_LTR_OpenUniv**	**R3_LTR_IuavUniv**
Name of the organization	Scoula Normale Superiore, Pisa	The Open University, Milton Keynes, UK	Iuav Univ. of Venice, Italy
Mission	The formation of scholars, professionals and citizens with a wide cultural background and with a strong critical attitude.	To be open to people, places, methods and ideas. We promote educational opportunity and social justice by providing high-quality university education to all who wish to realise their ambitions and fulfil their potential. Through academic research, pedagogic innovation and collaborative partnership we seek to be a world leader in the design, content and delivery of supported open learning.	The mission of the Video library is specialized the collection on documentaries about architecture, planning, design, and to make available the AV materials to the users. Other mission of the Video library is preserving the AV materials produced by Iuav University through digitalizing them.
Position in media lifecycle	Content and archive management, Technical management	Content and archive management, Technical management, Sales and rights management, and Distribution	Content and archive management, Technical management
Position in economic and political space	Public	Public	Public
Usage of media		AV production for teaching and informal learning and promotion for General public, Students/Teachers	Collecting, screening AV media during lessons and seminars for education & research for Students/Teachers
Usage of technology		Audacity (audio), Adobe Premier Pro (video), Final Cut Pro	VTR Panasonic VHS-DVD rec, IMAC 3.06 GHz i3, Analogic/digital converter pinnacle Movie Box Fireware, Final cut , and adobe Premiere
	Note: the Label Above - R1_RSC_Scoula referes to Report 1 of Research and scientific collections community of practice and the member Scoula Normale		

Properties of Class "Organisation" (Knowledge Schema)				
Report Number	**4**	**5**	**6**	**7**
Originated from	**R4_LTR_UnivDublin**	**R5_LTR_ScreenArchive**	**R6_LTR_InnsbruckUniv**	**R7_PPVP_Parallel40**
Name of the organization	University College Dublin	Screen Archive South East, Chichester, England	Univ. of Innsbruck	Parallel40, Barcelona, Spain
Mission	To support a high quality educational experience and engage in research-led teaching and learning.	To develop and maintain a public collection of moving images for the benefit of individuals and communities celebrate screen media as a social and cultural record and as an expression of artistic creativity preserve, document and promote screen media made in the South East of England….	Collect AV material to support research and education	Improve society through documentation
Position in media lifecycle	Content and archive management	Content and archive management	Content and archive management	Content and archive management, Sales and rights management, Distribution
Position in economic and political space	Public	Public		Commercial
Usage of media	To support education teaching and learning for Students/Teachers	Education,Broadcast, DVDs, Web, local history, Exhibition, Museums and Art Galleries, Artist's projects, Film, Film Festivals for General public	Teaching students, lending service for Students/Teachers	For theatrical commercial and non-commercial use, television, internet, dvd
Usage of technology		Macintosh, Projectors, Tape Decks, Capture Cards, Cameras, Scanners; Davinci Resolve, Final Cut Pro 7 and X, Avid, Premiere, Blackmagic Media Express, Soundtrack Pro, CatDV, Nuke,	Inhouse development of device	

Properties of Class "Organisation" (Knowledge Schema)				
Report Number	**8**	**9**	**10**	**11**
Originated from	**R8_PPVP_VETPostPT**	**R9_PPVP_CCMA**	**R10_PPVP_RTLNederland**	**R11_PPVP_ENEX**
Name of the organization	VET Post Production and Training, London UK	Library and Sales department, CCMA-Televisió de Catalunya, Barcelona, Spain	Documentation, RTL Nederland, Hilversum, Holland	ENEX, Luxembourg
Mission	Commercial and non-commercial post production facilities for TV Production,. Also a training provider.	In compliance with Parliamentaru mandate, CCMA's mission is to offer to all citizens of Catalonia quality and efficient public service broadcasting, committed to ethical and democratic principles while promoting the Catalan language and culture	Reuse of material, fact checking and documentation. Cultural obligation to the Dutch people.	Sharing resources, exchanging, coordination platform. Establish relations between medias.
Position in media lifecycle	Content and archive management,Technical management	Content and archive management, Technical management, Sales and rights management, Distribution	Content and archive management	Content and archive management, Technical management, Distribution
Position in economic and political space	Commercial	Public	Commercial	Commercial
Usage of media	We assist clients creatively and technically to produce and deliver video content for all platforms: broadcast, web, corporate...	CCMA must work to reinforce the presence of Catalan audiovisual media throughout all Catalan-speaking territories. It must foster development in social and economic fields and work closely with the educational system. It must promote the development of the Catalan audiovisual industry and of audiovisual productions in Catalan. It must also provide an impetus for content employing new technologies and kinds of public communication such as Digital Radio, DTT, Internet, and mobile telephones.	Reuse of AV-material for everyone inhouse (journalists, external costomers/ Enex/ other broadcasters / postproduction and few students)	Everyday News / 24 hours. EXEX holds totally 39 partners.
Usage of technology	Broadcast decks AJA and Black, Compressor, Avid MC, Final Cut	Our own video transfer equipment: Flexicart. It's an automatic system that intakes Betacam tapes, analog or digital, connected with a software (MultiIngest) that governs on one hand the reproduction of tapes in VTR's (Flexicart), and on the other the digitalisation of video signals (DSXPlayRec) in PCs recording (PCIODOCXX). The flexicart is a device that can hold up to 30 small Betacam tapes and 4 VTR's. Then, through an internal arm is capable of loading / downloading tapes in VTR's. All this is controlled by an external software called MultiIngest, created in-house. Archive material with time codes are automatically treated. Digitation is an audiovisual content management system (MAM) created in-house. Includes two different environments, Production and file with the same system of search and content management. Digital archive is the core both, of the production system and digital broadcasting.		

Propreties of Class "Need" (Knowledge Schema)	need1	need2	need3	need4	need5
Report Number	1	1	2	2	2
Need Belongs to	**R1_RSC_Scoula**	**R1_RSC_Scoula**	**R2_LTR_OpenUniv**	**R2_LTR_OpenUniv**	**R2_LTR_OpenUniv**
Need	Chemical analysis of analog audio material in order to apply available solutions	Software custmization and updation	Storage medium with large scale spinning disk system	Possibility to provide single version of access files to get accessible by different browsers.	Need better validation software
Involved Datasets	Gra.Fo	Gra.Fo	Storage	Fedora Web	Ffmpeg
Currently used Technology	Applied Solutions to current software but doesn't work	Gra.Fo Project specific software	Computer tape, hard disk and Digibeta	Fedora Web Interface	Checksum software, FFmpeg
Reason of Disatisfaction	They are not able to identify chemical issues of problematic audiotapes	Not custmizable, Not supported anymore	Limited life span	Need to produce several versions of access files to ensure accessibility by different browsers. Also some access formats are proprietary	Configuration is complex and output format issue
Desired Technology or Service	Audio tape chemical analysis service	mediARC software of NOA company	Large scale spinning disk system	No	
Barriers	No chemical analysis service providers for audio tapes exists. Funding	Price			
Requirements	NFR1	FR1	NFR2	NFR3	FR3
				FR2	

Properties of Class "Need" (Knowledge Schema)	need6	need7	need8	need9	need10
Report Number	3	3	4	5	5
Need Belongs to	**R3_LTR_IuavUniv**	**R3_LTR_IuavUniv**	**R4_LTR_UnivDublin**	**R5_LTR_ScreenArchive**	**R5_LTR_ScreenArchive**
Need	Need technology for video streaming	Technology to manage the metadata of all digital objects	Need Better Digital Asset Management System	Need practical solutions for ingest, processing, output and a digital carrier that can be guaranteed to last for hundred years	Technology to input user metadata flexibly
Involved Datasets	Video_Streaming	Metadata	Digital_Asset	Storage	Metadata
Currently used Technology	Cataloguing bibliographic software SOL - Sebina Open Library, part of SBN - Servizio Bibliotecario Nazionale. The software has specific fields for AV materials, according to the rules of guida alla catalogazione in sbn. materiale moderno.	University library online portal, e-Learning platform	Extensis Portfolio	Hard disk, digital mass storage system as Storage medium	CatDV, our own custom Filemaker Database with fields to collect basic technical metadata
Reason of Disatisfaction	Need technology (hardware and software) for streaming the video.		Scalability issues and resources.	No guarantees of long term access	Cannot input user metadata in flexible manner.
Desired Technology or Service	Need a Streaming server	A software/tool to manage preservation and access (consultation) in a coordinated way.	Institutional-level DAM.	Due to the lack of a digital storage medium with the long life of film and the problems associated with the need to re-capture our film masters as higher resolution capture become practical, we will need to keep our original films for the foreseeable future. Thus capturing film images is only an access activity. Until scanning, processing and long term storage match the long life and high resolution of film this will continue to be the case.	
Barriers					
Requirements	FR4	FR13	NFR4	FR5	FR12

Propreties of Class "Need" (Knowledge Schema)	need11	need12	need13	need14
Report Number	5	6	7	8
Need Belongs to	**R5_LTR_ScreenArchive**	**R6_LTR_InnsbruckUniv**	**R7_PPVP_Parallel40**	**R8_PPVP_VETPostPT**
Need	Create Master Archive Package	Need suitable tool for rights management	Need a common archive or joint venture on european or world level plateform	Need digital asset management system that is compatible with post production editing suites
Involved Datasets	Digitization	Rights_management	Common_archive	Digital_Asset
Currently used Technology	Davinci Resolve, Final Cut Pro 7 and X, Avid, Premiere, Blackmagic Media Express, Soundtrack Pro, CatDV, Nuke	No	No	No
Reason of Disatisfaction	Price and availability of Scanners especially small gauge. Photochemical Laboratories, Film Stocks			
Desired Technology or Service				ISIS, Interplay as digital asset management system
Barriers		No suitable tool available for our rights model, Limited human resources		Funding
Requirements			FR6	FR11
				NFR5

Properties of Class "Need" (Knowledge Schema)	need15	need16	need17	need18
Report Number	9	10	11	2
Need Belongs to	**R9_PPVP_CCMA**	**R10_PPVP_RTLNederland**	**R11_PPVP_ENEX**	**R2_LTR_OpenUniv**
Need	Need access to high quality images in archive	Need Updation of AVID software	Need Long term storage software	Better Technology to access through to Metadata and information representation
Involved Datasets	Image_quality	Search	Archival_storage	Metadata
Currently used Technology	In-house tool PROA provide access to images to multiple users	Online AVID software	Have a backup archive	Fedora Web Interface and Voyager libray management system/catalogue
Reason of Dissatisfaction	Access to offline reduced-quality copies of footage in archive	Less search functionalities, Old tool		Yes , RDF limitations within RELS-EXT (Fedora external relationships expressed as RDF) linked data
Desired Technology or Service	No	Updated version of AVID	Need storage software that can provide visibility of what is going on in archive and to have long term archive	No
Barriers				
Requirements		FR7	FR8	FR9
			FR10	_

Properties of Class "Dataset"							
Dataset Belong to	R1_RSC_Scoula_need1_2	R2_LTR_OpenUniv_need3	R2_LTR_OpenUniv_need4	R2_LTR_OpenUniv_need5	R3_LTR_IuavUniv_need6	R3_LTR_IuavUniv_need7	R4_LTR_UnivDublin_need8
title	Gra.Fo	Storage	Fedora Web	Ffmpeg	Video_Streaming	Metadata	Digital_Asset
language	Italian	English	English	English	Italian	Italian	English
locator	Server/ Database	Storage medium	Server/ Database	Server/ Database	Server/ Database	Server/ Database	Server/ Database
contributor							
creator							
createDate							
location	Tuscany	Milton Keynes, UK	Milton Keynes, UK	Milton Keynes, UK	Venice, Italy	Venice, Italy	Dublin, Ireland
description							
keyword	Audio, Gra.Fo software, preservation	Storage, storage devices, life span	Access, file version	Checksum, validation, configuration	Video, Streaming, software	Metadata, video	Asset management, DAM
genre	Audio	Storage	Access	Validation	Video	Video	Asset management
rating							
relation							
collection							
copyright	Preservation, half Online, In-house Access						
policy							
publisher							
targetAudience	Researcher, students, teachers	Researcher, students, teachers	Researcher, students, teachers	Researcher, students, teachers	Researcher, students, teachers	Researcher, students, teachers	Researcher, students, teachers
fragment:							
namedFragment:							
frameSize:							
compression:	PCM, WAV, 96k , 24 bit (Mono/Sterio)						
duration	2800hrs						
format	WAV						
samplingRate	96						
frameRate							
averageBitRate	fixed, 96-24 bit						
numTracks	102 audio						

Properties of Class "Dataset"						
Dataset Belong to	**R5_LTR_ScreenArchive_need9**	**R5_LTR_ScreenArchive_need10**	**R5_LTR_ScreenArchive_need11**	**R6_LTR_InnsbruckUniv_need12**	**R7_PPVP_Parallel40_need13**	**R8_PPVP_MFTPostPT_need14** Appendix
title	Storage	Metadata	MasterArchive_Package	Rights_management	Common_archive	Digital_Asset
language:	English	English	English	Austrian	Spainish	English
locator:	Storage medium	Database	Server/Tools	Server	Server	Server
contributor:						
creator:						
createDate:						
location:	Chichester, England	Chichester, England	Chichester, England	Innsbruck/Austria	Barcelona, Spain	London, UK
description:						
keyword:	Storage, storage devices, life span	Metadata, user metadata, Embed	Archive, Digitization, small gauge scanners	Rights management, data management	Joint venture, common archive, gloable plateform, videos	Digital asset management, Video, Post production
genre:	Storage	Metadata	Archive	Rights	Archive	Video
rating:						
relation:						
collection:						
copyright						
policy:						
publisher:						
targetAudience:	General public	General public	General public	Students/Teachers	TV industry, Internet, Public	TV brodcast, Internet, corporate
fragment:						
namedFragment:						
frameSize:						
compression:						
duration						
format						
samplingRate						
frameRate						
averageBitRate						
numTracks						

Properties of Class "Dataset"				
Dataset Belong to	**R9_PPVP_CCMA_need15**	**R10_PPVP_RTLNederland_need16**	**R11_PPVP_ENEX_need17**	**R2_LTR_OpenUniv_need18**
title	Image_quality	Search	Archival_storage	Metadata
language:	Spainish	Dutch	English	English
locator:	Server	Server	Server	Server/Softwares
contributor:				
creator:				
createDate:				
location:	Barcelona, Spain	Hilversum, Holland	Luxembourg	Milton Keynes, UK
description:				
keyword:	Footage quality, Access, archive	Video search, search functions, AVID	long term storage, archive, visibility	Video, Metadata harvesting, Metadata standards, metadata transfer, linked data
genre:	Image	Video	Storage	Metadata
rating:				
relation:				
collection:				
copyright				
policy:				
publisher:				
targetAudience:	Public	Public	Media, News Channels	Researcher, students, teachers
fragment:				
namedFragment:				
frameSize:				
compression:				
duration				
format				
samplingRate				
frameRate				
averageBitRate				
numTracks				

The Properties of Class "Functional Requirement" (Knowledge Schema)	FR1	FR2	FR3	FR4	FR5	FR6	FR7
Functional Requirement Belongs to	R1_RSC_Scoula_need2	R2_LTR_OpenUniv_need4	R2_LTR_OpenUniv_need5	R3_LTR_IuavUniv_need6	R5_LTR_ScreenArchive_need9	R7_PPVP_Parallel40_need13	R10_PPVP_RTL Nederland_need16
actor							
description	Migration of collection with metadata is not possible, As member is not using any standard metadata schema	Content needs to be fully accessible to staff and students where appropriate	Validation software FFMPEG during checksum or validation of files should make configuration easy and provide output in XML	OPAC SOL provides video content but we need streaming server to make them available and video streaming	Access to high resolution copies for cataloguing, edit and access both internally and from remote sites so as to allow integration of the multi-media with the Archive's catalogue.	To upload videos to a common plateform	More search functionalities and creativity to access videos from online software tools from AVID.
notesAndIssues					Long life and High Speed for Access		
normalCourseOfEvents							
alternativeCourses							
exceptions							
includes					Cataloguing, Edit and Access		
specialRequirements							
assumptions							
pre-conditions							
post-conditions							
priority							
frequencyOfUse							

The Properties of Class "Functional Requirement"						
	FR8	**FR9**	**FR10**	**FR11**	**FR12**	**FR13**
Functional Requirement belongs to	R11_PPVP_ENEX_need17	R2_LTR_OpenUniv_need18	R11_PPVP_ENEX_need17	R8_PPVP_VET PostPT_need14	R5_LTR_ScreenArchive_need10	R3_LTR_IuavUniv_need7
actor						
description	The Functionalities of new software - Statistics: How many watch an item, how do they watch it.	Multiple requirements - including examples given. Metadata harvesting, exporting, transformations of metadata to other standards, linked data capabilities e.g. triple stores, SPARQL queries, applications to enhance data with information from other linked-data sets	Visibillity of what is going on in the archive (ENEX only have a backup archive, no long term storage) wish for a monthly report about available space storage rack. And visibility of costs.	Affordable, fast, cost efficient, robust interface for access / data entry etc	More flexible input of user metadata. The ability to embed a variety of metadata sets into the digital file so that the digital object does not get separated from its contextual data	To embed metadata and to produce the metadata records (with the technical, bibliographical and administrative information) at the moment of the production of the digital objects.
notesAndIssues						
normalCourseOfEvents						
alternativeCourses						
exceptions						
includes						
specialRequirements						
assumptions						
pre-conditions						
post-conditions						
priority						
frequencyOfUse						

The Properties of Class "Non-Functional Req."			NFR1	NFR2	NFR3	NFR4	NFR5
Non-Functional Req Belongs to			R1_RSC_Scoula_need1	R2_LTR_Open Univ_need3	R2_LTR_Open Univ_need4	R5_LTR_Univ Dublin_need8	R8_PPVP_VETPostPT _need14
Quality in Use	effectiveness						
	efficiency						
	satisfaction						
		Usefulness					
		Trust					
		Pleasure					
		Comfort					
	freedom of risk						
		Economic Risk Mitigation					
		health and safety risk mitigation					
		Environmental risk mitigation					
	context coverage						
		Context completeness					
		Flexibility	Flexibility				
Internal and External Quality	functional suitability						
		Functional completeness					
		Functional correctness					
		Functional appropriateness					
	performance efficiency						
		Time Behaviour					
		Resource utilization					
		Capacity		Capacity			
	compatibility					Compatibility	Compatibility

Properties of Class "Non-Functional Req."			NFR1	NFR2	NFR3	NFR4	NFR5
Non-Functional Req. belongs to			R1_RSC_Scoula_need1	R2_LTR_OpenUniv_need3	R2_LTR_OpenUniv_need4	R5_LTR_UnivDublin_need8	R8_PPVP_VETPostPT_need14
		Co-existence					
		Interoperability					
	Usability						
		Appropriateness recognisability					
		Learnability					
		Operability	Operability				
		User error protection					
		User interface aesthetics					
		Accessibility	Accessibility		Accessibility	Accessibility	
	Reliability						
		Maturity					
		Availability					
		Fault tolerance					
		Recoverability					
	Security						
		Confidentiality					
		Integrity					
		Non-repudiation					
		Accountability					
		Authenticity					
	Maintainability						
		Modularity					
		Reusability					
		Analysability					
		Modifiability	Modifiability				
		Testability					
	Portability						
		Adaptibility					
		Installability					
		Replaceability					