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Audiovisual Digital Preservation

Status Report 4

Richard Wright, Preservation Guide

31/10/2011

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Abstract	The current status of audiovisual preservation as of October 2012 is described. This report comes at the end of PrestoPRIME, and begins a format that is intended to continue under the control of the PrestoCentre. To that end, this report has been coordinated with the 2012 annual report from EUScreen and with the variety of information available from the PrestoCentre website.		

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Scope

PrestoPRIME is the European publicly-supported project that addresses **preservation of digital audiovisual content**, and **access to audiovisual content in digital libraries,** using **Europeana** as our demonstration platform.

This document is the eighth in a series of annual reviews of the status of audiovisual preservation in Europe. The first four reviews were produced by PrestoSpace. Each has had a specific focus, plus providing a general summary of annual progress toward saving Europe's audiovisual heritage.

The fifth was the first produced under the PrestoPRIME project, and so covered the general area of digital preservation, as well as introducing the project.

The sixth (2010) introduced a format that was followed in 2011:
1) PrestoPRIME activity;
2) PrestoPRIME technology;
3) PrestoCentre report;
4) Brief Encounters: short reviews of general technology affecting audiovisual preservation;
5) UK, European and international project and policy developments affecting audiovisual preservation; and
6) Specific topics: technical information on audiovisual archiving, with more depth than in the Brief Encounters.

This 2012 report is the last to be produced by the series of PrestoPRIME projects that started twelve years ago with Presto. For the future, annual reports will be produced for the PrestoCentre following a new format. The scope of this year's report is somewhat reduced, and will not cover access in general – but instead will refer where appropriate to the EUScreen (Verbruggen and Oomen, 2012) report. Two issues with consequences for access are covered:
 (1) developments during 2012 in rights legislation, and
 (2) the technical issue of enabling search engines to access catalogue data.

This report will also refer to PrestoCentre versions of reports wherever possible, as one of the major tasks of PrestoCentre has been the conversion of PrestoPRIME (and other) reports to more concise and readable formats. Finally, as an alternative approach to 'brief encounters' with new technology, this report will review developments in audiovisual preservation as presented at PrestoCentre's Screening the Future conferences and in PrestoCentre reports, and as reported on the PrestoCentre website (prestocentre.org).

Executive summary

This document is a product of the EU-sponsored PrestoPRIME www.prestoprime.org, the major EC project on digital preservation in the audiovisual sector[1]. The current status of audiovisual preservation as of October 2012 is described, as an update to the series of annual reports on audiovisual preservation previously given in January 2005 to 2008[2] as products of the EU-sponsored PrestoSpace project, and in January 2010[3] and 2011 as PrestoPRIME reports. The PrestoSpace reports concentrated on digitisation, which remains a significant issue. The PrestoPRIME reports focus on digital preservation of a) the content coming from digitisation as well as b) content which is born-digital.

This October 2012 report (on the year 2012) has the following sections:

- A summary of PrestoPRIME public activity in 2012
- PrestoPRIME Technology: the technical outputs of the PrestoPRIME project
- PrestoCentre Developments in 2012: PrestoPRIME launched a competence centre, a membership-funded organisation for sustained support of preservation of Europe's audiovisual heritag. 2012 was PrestoCentre's first full year of operation
- Brief Encounters: summary information on technology developments affecting audiovisual content. The source of such information in the future will be the PrestoCentre, so this section is a hybrid: partly pointers to PrestoCentre information, plus just five short topics:
    - Continuing decline in availability of equipment and spare parts
    - A bumpy road for film and film technology
    - Vast undocumented collections in universities
    - Many developments in access (cf EUScreen report, Section 6.1)
    - Aggregation and metadata (cf Europeana, Section 6.2)
- The Value of European Media Collections: this is a large section, and the primary contribution of this report. It summarises the state of preservation of, and access to, European heritage audiovisual content, stressing the major role of broadcast archives. It points to the **European advantage**: only public service broadcast, primarily a European phenomenon, has produced such large, valuable and accessible collections – and asks whether exploitation of these collections can indeed be established at a European level, or whether exploitation of these publicly-funded assets will be left to individual broadcasters plus those few national audiovisual archives (INA in France, B&G in The Netherlands)
- EUscreen, Europeana and Access: a pointer to the comprehensive annual reports on access by EUscreen, and a technical summary of how important Europeana is as a mechanism for connecting catalogue data to search engines
- UK, European and International Developments: another pointer to PrestoCentre, where all such information will be found in the future
- Glossary: an extensive glossary of PrestoPRIME technical terms

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[1]PrestoPRIME is the only Integrated Project on audiovisual digital preservation under the 7th Framework of the EC IST programme: http://cordis.europa.eu/fp7/ict/telearn-digicult/digicult-projects-prestoprime_en.html

[2] All four are online PDF files, available free from PrestoSpace. Three are listed here: http://digitalpreservation.ssl.co.uk/general/#White%20Paper , and the fourth is here: http://www.prestospace.org/project/deliverables/D22-9_Preservation_Status_2008

[3] The PrestoPRIME reports from January 2010 and 2011 are also free and online: http://www.prestoprime.org/project/public.en.html

1   A summary of PrestoPRIME public activity in 2012

This document is a status report on audiovisual preservation, concentrating on the technical needs and problems of those responsible for audiovisual content. It is produced by the PrestoPRIME project which is concerned with meeting those technical needs, hence the inclusion of a review of PrestoPRIME work.

The year 2012 was PrestoPRIME's fourth. The project moved from the specification stage (of 2009) through development of systems and tools for audiovisual preservation (2010) and in 2011 has produced an integrated audiovisual preservation platform – and integration with an existing commercial platform: Rosetta. Public information about these PrestoPRIME developments are given in the next three sections.

> ## PrestoCentre
>
> The PrestoCentre competence centre had its first full year in 2012. There is a separate section on Presto Centre activity: Section 3, below.

1.1   Public Deliverables

The work of PrestoPRIME was formally reviewed in March 2012. Subsequent to the first review, a set of documents was made public on the PrestoPRIME website http://www.prestoprime.eu/project/public.en.html.

In December 2010 there were 14 public deliverables. In December 2011 there were 19. The new ones added since the March 2011 review were:

> D2.1.2 Tools for Modelling and Simulating Migration-based Preservation
> D2.2.3 Strategy for Use of Preservation Metadata within a Digital Library - with examples of use in audiovisual preservation
> D6.3.1 Financial Models and Calculation Mechanisms
> D2.1.3 AV Data Model: Final Specification
> D7.1.4 Audiovisual Digital Preservation Status Report 2

In October 2012 there are 23 reports, with new ones covering:

> D4.2.1 Vocabulary alignment Methodology
> D4.0.2 Metadata and Rights APIs and Service Interfaces
> D5.2.2 First Prototype of Open PrestoPRIME Reference Implementation
> D7.1.5 Audiovisual Digital Preservation Status Report 3

> ## PrestoCentre
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> During 2010-2012, the most useful PrestoSpace and PrestoPRIME reports have been revised for the PrestoCentre.
>
> Summary descriptions and keyword indexing have been added to improve the findability of these deliverables.
>
> After the end of the PrestoPRIME project, the PrestoCentre will continue to provide reports (from various sources) on audiovisual preservation.

The final public deliverables of PrestoPRIME will be added to the PrestoPRIME website after the final project review, and those with long-term public value will be revised for the PrestoCentre.

1.2 Presentations

Issues within the general area of audiovisual digital preservation have been presented by PrestoPRIME partners at major conferences during 2012.

FIAT/IFTA World Conference 2012, London, 29 September – 1 October: Daniel Teruggi of INA chaired a session on digitisation and migration technical problems ('the clinic').

Claude Mussou of INA chaired a session on web archiving.

John Zubrzycki of BBC R&D led a plenary session on digital archives.

Matthew Addis of IT Innovation participated in a session on cloud-based services.

Richard Wright chaired two sessions:
- "The Crisis Outside Broadcasting" highlighting the problems in film archives and in the university sector;
- "Asset Management or Digital Preservation" looking at what asset management systems provided to support long-term (at least 20 years) preservation.

ECLAP 2012 Conference, 7-9 May, Florence
Model, Format and Services for Audiovisual Rights Management, Laurent Boch, Annarita Di Carlo and Francesco Gallo; RAI-Radiotelevisione Italiana, Italy; Eurix, Torino, Italy. The proceedings are in a formal volume: see Boch et al, 2012.

PASIG Preservation Archiving Special Interest Group
- Date : 11-13 January 2012.
- Venue: Austin, Texas USA

Preservation of Audiovisual Material as the National Cultural Heritage Institute, presented by Ernst Van Velzen, CIO, B&G.
and
- Date : 17-19 October 2012.
- Venue: Dublin, Ireland

Presentations on PrestoPRIME and PrestoCentre by Marius Snyders, Martin Hall-May, Peter Schallauer, Walter Allasia.

iPRES, October 1-5 at the University of Toronto, Canada included a presentation on data integrity in digital archives by Nir Sherwinter, Ex Libris.

1.3 Training and Workshops

> **PrestoCentre**
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> After PrestoPRIME, PrestoCentre will continue to provide information on audiovisual digitisation and digital preservation at major conferences and events, such as the annual conferences of IASA, FIAT-IFTA and AMIA, and the PASIG. IDCC and iPRES events.

> **PrestoCentre** is now on the PASIG steering board and is in charge of a recurring PASIG conference session dedicated to digital audiovisual preservation.

The **PrestoCentre** Screening the Future 2012 conference in Los Angeles in May was a major event related to PrestoPRIME, and is described in detail in Section 3, below.

During the conference, a presentation on PrestoPRIME and Europeana was given by Daniel Teruggi, Head of R&D, Institut National de l'Audiovisuel de France.

> "Even if digitization seems to be the right way to go, its complexity and cost often constitute drawbacks for any content holder. Technical complexity, format decision, legal environment or online publishing, are considerations that tend to postpone digitization actions mainly for small collections or individual content holders. Many projects have shown the way on "how to do it" and which decisions take. This presentation will present two major approaches : the PrestoPRIME and the Europeana projects in Europe and their consequences and implications for small and medium archives."

Sept 2012: PrestoPRIME Final Test Workshop. A final evaluation on the results of the PrestoPRIME project and to give all interested parties another chance to probe and test our project results and tools.
- Date : 12-13 September 2012.
- Venue : INA, Bry sur Marne (Paris).
- Program : Interactive Workshop; in the morning the PrestoPRIME systems, tools and solutions were presented, explained and discussed. The afternoon was for hands-on testing, further discussions and dedicated sessions on individual tools.

Sept 2012: PrestoPRIME Results Workshop (preceding FIAT/IFTA world conference):
- Date : 28 September 2012.
- Venue : BBC R&D, London.

Program :
Final Integrated Results and P4 PrestoPrime Preservation Platform (Laurent Boch - RAI)
Service Management and Cost Modelling Tools (Matthew Addis/Stephen Phillips – IT Innovation)
Quality Analysis and Metadata Management Tools (Peter Schallauer – Joanneum Research)
Fingerprinting and Content Tracking (Jean-Hugues Chenot - INA)
The Added Value of User Annotation (Michiel Hildebrand/Riste Gligorov – Vrije University)
Rights Management – Rightsdraw tool and MXF tool (Laurent Boch –RAI)

> **PrestoCentre** The workshop ended with a PrestoCentre Foundation presentation and Q&A by Marius Snyders – B&G

A handout from this workshop giving digital preservation references is an Appendix to this report.

1.4   Standardisation

PrestoPRIME continued work with several areas of international standardisation:

MPEG – There is a new activity in MPEG called MPDI (Multimedia Preservation Description Information), aiming at defining a new MPEG standard for digital preservation. The initiative is chaired by Eurix and by the US standards institute NIST. PrestoPRIME has supported this work by gathering user requirements through a questionnaire.

http://mpeg.chiariglione.org/hot_news.php
http://mpeg.chiariglione.org/working_documents/explorations/preservation/Pres_reqs.zip

In addition, the PrestoPRIME work at RAI on a rights ontology and related tools (CEL: Contracts Expression Language) has been taken up by a new MPEG activity PPAVRO on an Audiovisual Rights Ontology and associated expression in SML and OWL (web ontology language). See Boch et al, 2012. http://www.fupress.com/Archivio/pdf%5C5185.pdf

MAWG – Joanneum and the University of Amsterdam worked with the World Wide Web Consortium's Media Annotation Working Group. They were developing web standards for accessing the time dimension of online media. Activity appears to have ended in 2011.
http://www.w3.org/2008/WebVideo/Annotations/

Wrappers – BBC R&D is continuing to work with a range of bodies on improving the standardisation – and in particular improving the consistency of the implementation of standard – for video content. There is work on application specifications for MXF (narrowing the scope to improve the interoperability) that includes working with SMPTE, the EBU and the US Library of Congress, as well as the trade body AMWA. The BBC has also agreed a UK standard for video interchange between broadcasters, and is working with SMPTE, Front Porch and the Japanese broadcaster NHK on a resolution of the incomplete AXF standard.

Quality Control – BBC and Joanneum are working in the European Broadcasting Union's Strategic Programme on Quality Control. This is a relatively new area for the EBU, with far-reaching implications if agreement can be reached on methods for defining, measuring and controlling the quality of video images.
http://tech.ebu.ch/Jahia/site/tech/cache/offonce/groups/qc;jsessionid=5033EA6A2705A9F5FB9F1A36856E2F23.jahia1

2 PrestoPRIME Technology

In 2010 a public workshop was held in November where a range of audiovisual preservation tools was demonstrated, but the tools were working in isolation. In 2011 these tools were integrated to work with P4, the PrestoPRIME Preservation Platform – and where appropriate to also work with Rosetta. The integrated platform was publicly evaluated during a week-long session in early November 2011, held at the RAI Research premises in Turin.

A final evaluation of the results of the PrestoPRIME project was held on 12-13 September 2012, to give all interested parties another chance to probe and test the project results and tools. The venue was INA in Bry sur Marne (Paris). The format was an interactive workshop; in the morning the PrestoPRIME systems, tools and solutions were presented, explained and discussed. The afternoon was for hands-on testing, further discussions and dedicated sessions on individual tools.

A comprehensive report on the evaluation has been produced as PrestoPRIME deliverable D8.2.1 Report on the Final Evaluation Phase.

The following sections provide information on the PrestoPRIME technology.

2.1 Introduction: the tools in context

PrestoPRIME has publicised its developments wherever possible, including the PrestoCentre Tools Library http://www.prestocentre.org/library/tools, and individual partner websites:
- LTFSArchiver http://www.crit.rai.it/EN/attivita/opensource/index.htm
- storage and service planning and monitoring: http://prestoprime.it-innovation.soton.ac.uk/
- metadata tools: http://prestoprime.joanneum.at/

At the FIAT-IFTA workshop on 28 September 2012, the integrated system was presented, along with detail on two classes of tools:
1. Tools that were (or could be) integrated in a digital preservation system, specifically either P4 (the PrestoPRIME system) or Rosetta (the Ex Libris system);
2. Tools that worked independently, such as the simulation tools from IT Innovation or the crowdsourcing tagging tools from the Free University of Amsterdam (VUA).

2.2 General descriptions

At the PrestoPRIME 2012 Workshop which was held on 28 September as a satellite event of the FIAT-IFTA annual conference, the following tools were described:

PrestoPRIME Tools:

P4-System (all tools in one system)
☐ contact: Francesco Gallo gallo@eurix.it

The PrestoPRIME Preservation Platforms combines all single tools developed in the project in one single Digital Preservation System. P4 provides basic functionalities for ingesting, updating, accessing and managing files and metadata, introducing an adopted SIP-structure based on METS. P4 provides as well a common GUI for all

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steps.

The test-bed contains approximately 2TB of test-data from RAI, BBC and ORF. and University of Innsbruck.

Rosetta-System (with incorporated PP-tools)
 contact: Nir Kashi Nir.Kashi@exlibrisgroup.com

Rosetta is the first (and so far the only) commercial system that provides a full longterm digital preservation solution. Rosetta implements and relies on national standards such as: OAIS, PREMIS, METS, TDR, etc. and implemented in 15 institutions worldwide. A new version of the Rosetta system was developed for integrating with the PrestoPRIME tools. Using the 'open platform' approach, the new Rosetta version provides an extensive 'Integration Points' layer (plug-in, APIs, Reports, etc) that enables the integration with the different PrestoPRIME tools

AV – Quality Assessment
 contact: Peter Schallauer peter.schallauer@joanneum.at

The Quality Analyser and Quality Summary tools allow for content based, referencefree, automatic analysis of visual impairments in video and film content and for summarisation and human verification of automatically detected impairments. The Quality Analyser is carried out automatically during the ingest process with no user interaction required and with a potentially long computation time (especially for videos with high duration); we concentrated in this test setup on the usability of the Summary tool.

The Quality Summary tool provides a temporal visualisation of defects (currently video breakups, uniform colour frames, test pattern), quality measures (currently noise level) and video/film contents (e.g. shots, key frames, stripe image). Apart from improvements in the validation workflow, a new sharpness estimation module has been added.

Metadata Mapping
 contact: Werner Bailer werner.bailer@joanneum.at

JRS will test a metadata mapping service, together with a new configuration interface for customizing mappings. The tool can map from the metadata format used in various organizations to the standard formats of MPEG-7, EBUCore or the Europeana Data Model.

User-Annotation
 contact: Michiel Hildebrand michiel.hildebrand@vu.nl

InitiallyWaisda? is a labeling game for video. Initial prototypes of Waisda? were used in two pilot studies at the Netherlands Institute for Sound and Vision, in which more than a million user tags were collected. Now there is the open source version of Waisda? that everybody can use to let the crowd tag their video collection. During the PrestoPRIME testbed the team of the VU University Amsterdam was available to

setup prototypes for various user collection, beginning with videos in mp4 or flash video.

Fingerprint (content tracking via Fingerprints)
☐ contact: Jean-Hugues Chenot jhchenot@ina.fr

A system to explore accurate data on the repetition of audiovisual contents on TV channels. A full record of repeated (5 seconds to 1 hour) segments of audio and video is available. The interface allows exploring the database or repeated contents on more than 10 TV channels since January 2010 to present and to cross-check with additional video files.

Since last test-bed in Turin in November 2011, the amount of contents analysed has grown up to 250000 hours, and interfaces were prepared to deliver results of specific requests to the P4 system.

Modelling
☐ contact: Matthew Addis mja@it-innovation.soton.ac.uk
This station demonstrates two planning tools that allow the user to make comparisons between different storage systems in terms of the long-term cost of storing of AV content versus the risk of loss.
- The first storage planning tool is for long-term planning and allows the user to assess at a high level whether to use, for example, data tape on shelves or an HSM (hierarchical storage management) system. This helps the user narrow down the options of available storage systems. The user can define different storage systems (in terms of cost and failure rates). The tool comes preloaded with some defaults derived from storage providers and field studies, and the user can define their own. The user can then take a pair of storage systems and build them into a 2-copy system.
- The second tool is iModel, an interactive storage simulation tool, which allows the user to perform interactive simulations of ingest, access, the effect of corruption and active preservation. The tool simulates a live archive in accelerated time in order to see, understand and balance preservation activities with ingest/access. The user provides inputs to the model, such as the workload on the storage systems, the cost components of the services, the resources available and priorities for different tasks (e.g. ingest, access, migration etc.). The tool gives output in graphical form, showing the total cost over time, asset loss and statistics related to ingest/access, such as average access times, ingest queue lengths etc.

MServe / TING
☐ contact: Martin Hall May mhm@it-innovation.soton.ac.uk
This station demonstrates three tools working together.
- MServe is a web service for processing and storing data and is specifically designed for audio-visual content. It allows the user to manage long-term retention and access to data according to the OAIS model. MServe provides a web GUI and REST interface to control the ingest, access, processing and manipulation of data using compute resources.
- Ting is a generic service monitoring and management framework. It allows a service provider to define service offerings, agree service level agreements

(SLAs) with customers and to automatically monitor and manage the customer's use of the service according to the terms of the SLA. It is demonstrated here by monitoring the use of an MServe installation.

- The iModel storage simulation tool (separately demonstrated at station G1) is integrated with Ting to provide a means to predict future archive trends based on the current configuration and historical usage of an MServe installation.

MXF Tools, DRACMA, LTFSArchiver, Automated SIP Submission

☐ contact: Laurent Boch lboch@rai.at

Several components and systems supporting archival processing of master quality media files are showed, demonstrated and explained.

- LTFS-Archiver is a service (open-source) providing means to benefit of LTO storage technology, with LTFS, with and without automated libraries. This will support the scenario of having Content stored on LTO tapes only (master level) and being able to perform all the needed archival processes (integrity, migration, access, partial retrieve).
- DRACMA is a set of services that, after indexing Master files on ingest time, is able to provide very efficient access in partial retrive mode. Currently works and is demonstrated on MXF/D10 files. Can work also on LTO-LTFS storage.
- MxfTechMDExtractor is a tool for extracting technical metadata from MXF Headers according to the SMPTE definitions. The extracted information can be inserted into
- the Archival Information Package for use during the Preservation Process. D10SumChecker is a tool supporting media file integrity check on an Edit Unit basis (works on MXF/D10 files). In case of file corruption it will be possible to identify the corrupted and uncorrupted parts, and implement smart recovery even from two corrupted copies (provided errors are not located in the same place). It is always possible to make partial retrive of the uncorrupted parts.
- Automated submission using Mets format will be also demonstrated.

RightsDraw2

☐ contact: Annarita Di Carlo a.di_carlo@rai.it

This addresses the ambitious goals of defining a model of audio-visual rights and of providing the tools proving the concept that managing rights in the real world is possible. Rights can be perceived as complex and often they are complex, because they have to express all the conditions that can be required for the exploitation of our intellectual property works. However the MPEG21 Media Value Chain Ontology (MVCO) already provided a robust starting point for defining a model appropriate to the real world needs. We decided that the work we did in PrestoPRIME for creating our PrestoPRIME AV Rights Ontology needed to be consolidated within an ISO Standard in order to become an asset useful universally. That's why we put a relevant effort in the definition of MPEG21 Contract Expression Language (CEL - currently Draft International Standard).

Rightsdraw(v2) is a set of services and tools (open-source) for working with rights according on MPEG21-CEL both in contexts dealing with contracts and in those dealing with management of owned rights, such as the PrestoPRIME archival scenarios.

Rightsdraw combines various working environments in order to allow the user to deal with just the needed level of complexity. The experts will be able to operate with all the facets offered by the model and will be called to use their competence to define exactly all the clauses. However a major quantity of work can be done quite quickly and simply, once the main recurrent key rights patterns are well defined, with a lower level of expertise, reducing the errors and costs.

iRODS, Multivalent
□ contact: Adil Hasan adilhasan2@gmail.com   or
□contact: Jerome Fuselier jerome.fuselier@free.fr

- iRODS is fully integrated into P4 as a policy-driven data management system. The system comes with a number of built-in policies controlling access and storage. Two new policies have been implemented to automatically asynchronously replicate data to another resource and a policy to detect and repair 'broken' files (where broken corresponds to a difference between the actual md5 checksum value and the value calculated upon ingest). New since last testbed: migration from old format rules to new format rules, complete integration into P4, GUI interface to manage and audit iRODS rules.
- Multivalent is a preservation software, its goal is to ensure that a set of preserved files will still be accessible in the future. The framework provides a set of media engines which are able to parse and decode a range of common file formats. It can also add functionalities to an existing format specification like for instance annotation capabilities.

New from last test-bed:
- Improvement on the MXF support,
- Support for the BBC MXF files.
- Modular MXF library, it can be used without Multivalent.
- Extensible library, it's possible to add new formats/codecs to manage more audio/video file formats.

The demo will show the latest improvements made to the embedded MXF library.

3   PrestoCentre Developments in 2012

PrestoCentre had many activities in 2012, including:
- The first year of operation as an independent foundation ran by B&G as the connection with PrestoPRIME
- Start of membership and improvement of web services
- The second international conference *Screening the Future* in Los Angeles. This conference fulfils the requirements for PrestoPRIME deliverable D8.1.2
- The launch of the PrestoCentre magazine, AV Insider http://www.prestocentre.org/avinsider

3.1   Screening the Future Conference II: Play, Pause and Press Forward

This major event attracted international attention. The major relevant blogs are:

http://blog.dshr.org/2012/05/master-class-at-screeing-future-ii.html (David Rosenthal, USA)
http://www.avarchivering.nl/node/1471 (B&G, Netherlands)
http://www.ncdd.nl/blog/?p=1862 (Netherlands Coalition for Digital Preservation)
http://news.usc.edu/#!/article/35122/can-culture-be-digitally-preserved/ (Univ of Southern California, Los Angeles, California, USA)
http://www.t3media.com/2012/05/paramount-case-study-at-the-screening-the-future-conference/ (Paramount Studios, Los Angeles, California, USA)
http://www.businesswire.com/news/home/20120521006567/en/AV-Insider-Magazine-Launches-Los-Angeles-Connect (US and international business news)
http://girlinthearchive.wordpress.com/2012/06/page/2/ (UK blog, from a BBC archivist)
http://librarchivist.wordpress.com/2012/05/25/the-present-and-future-of-audiovisual-archives-screening-the-future-2012-los-angeles/ (from a UCLA audiovisual archivist)
http://www.flickr.com/photos/61110178@N02/sets/72157629830597610/ (photos)

The programme highlights are giving in the following table:

PrestoCentre Screening the Future Conference 2012: Play, Pause and Press Forward
May 21–23, University of Southern California, Los Angeles, USA. http://www.prestocentre.org/events/screeningfuture/2012
Day 1 highlights: Keynotes: • The Future of audiovisual media, technology and the user; • The Future of Media Collections   Reality Checks: gathering the experiences, opinions and perceptions of leading experts and organizations about the future and archival challenges in their specific domain: • Broadcast production; • Film production, animation and 3D; • Audiovisual Research Data; • Art Performances

- Fine Art Collections

Speakers include: Howard Besser (NYU), Sam Gustman (USC Shoah Foundation and Digital Repository), Rob Hummel (Legend 3D), Andrea Kalas (Paramount Pictures), Pip Laurenson (Tate Gallery), Mark Lemmons (Thought Equity Motion), Jazz at Lincoln Center (Kay Niewood), Lev Manovich (University of California), Jan Müller (PrestoCentre Foundation), David Rosenthal (Stanford University), Nan Rubin (Community Media Services), Andrew G. Setos (Blackstar Engineering Inc.), Daniel Teruggi (PrestoPRIME project), Jim DeFilippis (Fox)

Day 2 highlights:
Managing the cost of archiving – Budgeting, forever cost and endowment pricing
Archiving in production – The position of archives in the rapidly changing AV production climate
Trusting the future archive – Trusted auditing and certification of audiovisual archives and repositories
Archiving future data – The attributes and requirements of future generated AV data.
Screening night: Lost Landscapes, by Rick Prelinger

Speakers include: Stephen Abrams (University of California), Matthew Addis (IT Innovation), Bruce Ambacher (University of Maryland), Howard Besser (NYU), Karen Cariani (WGBH), Greg Head (Walt Disney), Peter Kaufman (Intelligent Television), Louis King (Yale University), Pip Laurenson (Tate Gallery), Kara van Malssen (AudioVisual Preservation Solutions), Lev Manovich (University of California), David Rosenthal (Stanford University), Raivo Ruusalepp (Estonian Business Archives), James Snyder (Library of Congress), Daniel Teruggi (PrestoPRIME project), Bill Thompson (BBC), Jeff Ubois (Personal Digital Archiving)

Day 3 highlights: Conference Tours:
Paley Center for Media (tech department tour), Paramount Pictures Studios,
Sony Pictures Studios, USC Shoah Foundation Institute and Digital Repository,
Warner Brothers Studios

Speakers include: Sam Gustman (USC Shoah Foundation and Digital Repository), Brewster Kahle (Internet Archive), Louis King (Yale University), Ben Moskowitz (Mozilla)

3.2   The Launch of the PrestoCentre Magazine: AV Insider

From the PrestoCentre website
http://www.prestocentre.org/avinsider :

"AV Insider is a new magazine for the audiovisual digital preservation community, introducing you - first hand - to the faces doing the crucial work for AV digital preservation. Get to hear their opinions, perspectives,

challenges, and how they understand their work and the work of their organisation and others in the context of this broader community. The magazine will also keep you up-to-date on the latest news from within the domain and offers articles related to policy issues and challenges, the educational landscape, funding and budgeting, long-term storage, and research and development, just to name a few.

Each edition focuses on a theme, giving attention to developments and challenges within the domain. Readers will be offered a variety of voices, articles, and short bites that paint a picture of the people, organisations and issues that populate this diverse community of AV digitisation and digital preservation."

The first two editions were free to all, and subsequently the magazine will become for members-only. The first edition was launched in time for the Screening the Future II conference in May, and the second in time for the FIAT-IFTA conference at the end of September.

The magazine has a print-run of 2000, and receives around 1.000 unique views per month.

4   *Brief Encounters*

In 2010 and 2011, there were sections of this annual report that took note of current developments in technology that were of interest to audiovisual preservation and access, as a sort of *technology watch*. During 2012 the PrestoCentre has been running various activities that also have a *technology watch* function:

- a blog with international contributions: http://www.prestocentre.org/blog/
- a section on news: http://www.prestocentre.org/news/

Some of the topics covered by the PrestoCentre in the last year were:

- http://www.prestocentre.org/blog/glacier-causes-global-warming on the latest Amazon cloud-storage offering
- http://www.prestocentre.org/blog/making-money-av-archive-content on the growing demand for content
- http://www.prestocentre.org/blog/new-age-rights on developments in rights following an international summit on Internet rights, and the UK Hargreaves review
- http://www.prestocentre.org/blog/what-big-data-and-why-should-we-care on the economic significance of data analysis

For up-to-the-minute reports on technology developments, a website that is updated daily is obviously a better source than an annual report. Accordingly, it is suggested that in the future there will be no need for a Brief Encounters section as the PrestoCentre website will already have covered such developments, and provided the information months earlier. Instead, it is suggested that future annual reports might have a section summarising developments and trends (though annual summaries would also appear on the PrestoCentre website, as was the case with this review from January 2012: http://www.prestocentre.org/news/digital-preservation-and-online-video-%E2%80%93-replaying-2011-projecting-2012)

To that end, here is a summary of technology development trends in 2012:

- Continuing decline in availability of equipment and spare parts
- A bumpy road for film and film technology
- Vast undocumented collections in universities
- Many developments in access (cf EUScreen report, Section 6.1 , below)
- Aggregation and metadata (cf Europeana, Section 6.2 , below)

4.1   Continuing decline in availability of equipment and spare parts

It is easy to identify an obsolete format. Once the playback technology is no longer produced, the format is formally obsolete. The effects may not be felt immediately, because for some equipment there are manufacturers who continue to provide maintenance for several years. Other formats lose all support within a year.

But beyond official support from equipment manufacturers there is a grey area where equipment is capable of being maintained because of:

- large amounts of working machines in the field
- potential for cannibalisation (stripping and re-use for spares and repairs) of non-working equipment
- dealers or service providers with in-house expertise in maintenance

So when is equipment really a problem? One clear sign is when the price of used equipment ceases to fall, and instead begins to rise. Within 2012 (though this may have started a year or two earlier) there has been a dramatic rise in the prices for used ¼-inch (6mm) open-reel audio tape equipment. Currently on eBay:

- a Revox pinch roller (a £25 part when new) for sale at £45
- a faulty Revox A77 for £225
- a working Revox A700 for £500
- an unused (but 25 years old) Revox B77 for £2800

DAT machines (a digital audio format) have been in short supply for many years, with the result that current eBay prices range up to £600 for used-but-working professional equipment (eg Sony PCM-R700, list price £2000 when new).

There is only one working U-Matic player on eBay in the UK (October 2012) ! As for the last professional analogue format, the Sony Beta SP – that has eight used machines, ranging in price from £150 to £2400.

Persons in serious need of professional equipment will of course look beyond eBay, at specialist equipment providers and specialist websites and forums (like the PrestoCentre forum). The point of the eBay listings is to demonstrate the small amount of equipment available and the consequent high prices.

4.2   A bumpy road for film and film technology

The end of film has been forecast again and again, but the film currently in proper storage could well last for another century – and certain film formats could last for another 400 years.

However the 'rush to digital' was running strongly in 2012. Examples are:

- Norway completing the conversion of all cinemas in the entire country to digital projection (though some will retain analogue projection as well)
- All the neighbourhood cinemas in Hanoi are now digital (as reported by the Vietnam Film Archive in September 2012)
- A riot of postings on the AMIA email list about the end of the line for independent cinemas (who may not be able to afford digital projection)

To add to anxiety, in January the Kodak corporation (in the USA; the action doesn't apply to non-US parts of Kodak) took the following action:

> *On January 19, 2012, Eastman Kodak Company and its U.S. subsidiaries filed voluntary petitions for Chapter 11 business reorganization in the U.S. Bankruptcy Court for the Southern District of New York.*
> *http://www.kodak.com/ek/US/en/Kodak_Transforms/Home.htm*

Surprisingly, in August Kodak announced new archival film types! This action may reflect a general move in the audiovisual production and post-production market to recognise the importance of archives: film production is virtually gone, but film archives are increasing their activity. One would like to give credit to the Presto series of projects for two developments:

- technology and service providers paying attention to archives
- a consequent increase of business and reduction in prices

www.kodak.com/go/archive
http://motion.kodak.com/motion/About/The_Storyboard/4294969992/index.htm?goback=.gde
_3982179_member_163111458#ixzz26Lk0bAV9

One area of technology of immediate relevance to film, digitisation and preservation is the datacine sector: the equipment that scans film and produces high-resolution files (NOT video; that lower-resolution equipment is called telecine, not datacine). When the DFT company participated in a PrestoCentre workshop in 2011, they said that 'about half' of datacine work was now coming from archives – a trend that can only increase (as film ceases to be used, at all, for production of new content).

Unfortunately, the highest-specification telecine and now datacine equipment has had financial problems for 20 years, and DFT was taken over by Prasad in August of this year. There are several manufacturers of datacine equipment aimed at the archive market, but the DFT certainly had an excellent technical specification, particularly regarding dynamic range. One of the roles of PrestoCentre is to maintain up-to-date information on sources of equipment, including information about their detailed technical specifications and suitability for archive use.

4.3   Vast undocumented collections in universities

In 2009 Indiana University completed an extensive study, to find (so far as they could, with 18 months of planning and investigation) ALL the audiovisual holdings on one university campus in Bloomington, Indiana (Casey, 2009). The university had major collections of recorded music, and new before the study that there were roughly 200 000 items. What they found after a thorough search – looking at all departments from arts to zoology and all points in between – was nearly three times as much: 570 000 items.

Indiana University Bloomington is one campus. There are roughly 4000 universities in North America and another 4000 in Europe. At only 10 000 items each, that adds up to 80 million items (something like 40 million hours by the usual 'rule of thumb' that items average half an hour).

PrestoPRIME has made its own survey of 400 European universities (results in preparation) and with 200 responses has found an average of 8000 hours of content at each responding institution. These are responses that are not based on an exhaustive search – and usually represent only the audiovisual holdings of the university library. The University of Innsbruck conducted the survey, and their more thorough search of their own institution found 100 000 hours of content.

The methodology can be questioned and the conversion between items and hours can be questioned, but what cannot be questioned is the general conclusion: at least 40 million hours of content is held in European and North American universities. According to the Indiana results, probably 60% is undocumented and not under any form of preservation plan. Further, over 80% exists as a single copy of unique material, and hence is at great risk of loss.

It is ironic that universities are leading the way in development of digital preservation technology, while sitting on a vast potential disaster of unprotected analogue content.

4.4   Many developments in access

Access technology and projects are certainly the most visible and probably the fastest-changing aspect of archives. Fortunately there is comprehensive information on a wide range of development in the EUScreen report: http://blog.euscreen.eu/?p=3235

EUScreen is an EC-supported project affiliated to PrestoPRIME and the PrestoCentre. In future years, information on access to audiovisual content (as with information on preservation) can be consolidated and supplied through the PrestoCentre and its website.

4.5   Aggregation and metadata

A major issue in access is the problem of finding material. The EUScreen report reviews research on search technology including the semantic web, linked-data and crowd-sourcing for metadata generation.

At a less exciting and more purely technical level, there is one issue facing online access every collection that is described by a formal catalogue: such data is usually inaccessible to search engines.

Europeana has a solution to this problem, which requires exporting metadata to Europeana (which then stuffs the data in its own 'union' catalogue). So how can search engines access the aggregated metadata? Through specific technology implemented by Europeana and described in Section 6.2 , below.

5   The Value of European Media Collections

5.1   Summary

Europe has a unique resource: the archives of public service broadcasting. The general commercial significance of 'media industries' is presented, along with their larger public value. Broadcasting is radically increasing its use of Internet and mobile technology, leading to a great increase in archive access and a redefinition of broadcasters as publishers – with all their content potentially available on demand. Europe is unique in having public service collections built up over 50 years or more – content paid for by licence fees, and archives which are the largest collections of media anywhere (a dozen archives with over one million hours of content each). These collections have good documentation (generally) but their commercial and public value will only be released through a concerted programme of digitisation, rights management, metadata normalisation and conversion to multilingual access. Brave and innovative action will be necessary for Europe to unleash the value of "the largest audiovisual collections anywhere".

The rest of Europe's audiovisual heritage (outside of broadcasting) is also reviewed in terms of size, condition and public value. Here documentation varies enormously, and preservation status is generally poor. The situation here is stark, with little concerted action for digitisation. Without such action, the forecast is clear: *the majority* of the current holdings will become unusable over the next twenty years.

We present the case for investment in this content as having low marginal cost and high potential return. The cost is low in comparison to the investment which has already been made to produce the materials bring them into formal collections. The short-term potential return is high in terms of increase in breadth, depth and interest of European online content. The long-term value is the preservation of unique heritage: the audiovisual record of the Twentieth Century.

5.2   The Uses of Media

5.2.1   Development of media industries

Audiovisual technology is about moving the surrogate of a sensory experience across time and space. Starting in the 1870's, the Bell telephone allowed sound transmission across great distances, though only in real time. Very soon afterwards, sound was recorded to be replayed later, and elsewhere. Images had been recorded forty years before, but "moving images" were a technology of the 1890s – when the roll-film developed by George Eastman was used in the Edison Kinetograph, and projected to an audience using the Lumiére Cinématographe.

These developments in technology were quicky converted into major industries of telephony, recorded sound and cinema, all spawned near the beginning of the 20th Century

Broadcasting as an industry is later (by about 20 years) and more complex, because the concept of a broadcast preceded the technology of radio (wireless communication). Early 'wireless telegraphy' in the 1890s carried weather and other information from coastal transmitting stations to ships at sea (at least, to those ships that purchased the Marconi

equipment). The technology needed no wires, but used Morse code, not audio. Radio combined wireless broadcasting with speech, and reached a universal audience rather than just 'all the ships at sea'.

All three industries (recorded music, cinema, broadcasting) started as commercial enterprises. Even the BBC was the British Broadcasting Company from 1922 to 1927, when three things happened:

- the name changed to the British Broadcasting Corporation;
- a radio licence was required for legal operation of a radio receiver;
- the BBC was given a royal charter to operate in the public service (and in return to collect the radio licence fees);

Thus public service broadcasting was born, as an idea unique to Europe (though passed around the world in emulation of the European model). It was not commercial, but paid for directly by the listeners. Neither was it simply an organ of the government, as are so many 'state broadcasters' across the world.

Television had a slow start, with experiments in the 1920s and a brief pre-war launch by the BBC in 1936. The industry became general across Europe in the early 1950s – it's 50th anniversary was the motivation for the Birth of Television project, the first EU project to creat a website for archive television from many broadcasters (and the predecessor of the VideoActive and EUScreen projects).

Formats have evolved: recorded audio progressed from wax cylinders to shellac (78s) and then to vinyl (45s, LPs) and then to cassette tape in the 1970s, the first optical format for audio (CD) in the 1980s and finally in the late 1990s to files that could be played by devices with no moving parts at all (MP3 players). Meanwhile a range of other media were used to record (6mm open-reel audio tape, DAT and minidisc).

Film became a home-consumer medium in the 1920's with the development of smaller formats (Baby Pathe at 9.5 mm and various cameras and projectors for 16mm and then 8mm). An average person in the 1950s through to the 1970s could shoot and project film, but video as a consumer medium (allowing a person to own and view an individual copy of a cinema feature film) became popular with the development of cassette media, ending with the dominance of the VHS format in the early 1980s. VHS was then overtaken in the 1990s by DVD, just as the audio cassette had been overtaken by the CD.

Public service broadcasting: the freedom from commercial and governmental restrictions produced in the Twentieth Century, in Europe, a particular form of broadcasting: large organisations dedicated to public service, and so originating radio (and later television) programmes of national significance, and doing so for many hours every day. This notable, rich and unique output has been collected in broadcast archives which now (2012) have been in existence for many decades. The result is million-hour (or larger) collections right across Europe: Austria, Italy, France, The Netherlands, the UK, Germany and Sweden all have broadcast collections that exceed in size anything in the USA (or anywhere outside Europe).

Now we have 'new media' – a loose category of on-demand services to computers via the Internet and to mobile devices via high datarate telephone (3G and now the emergence of 4G). But new media is both old and new: it is a change of carrier, just as moving from wax cylinders to shellac discs was a change of carriers. However new media brings genuine

innovation, particularly in *connectivity*: carriers don't sit on an individual owners shelves, but instead the content can instantly be shared and cross-referenced as part of a global web of information. The next section is about use of new media.

5.2.2   Current and emerging uses of media

Broadcasting is what people do. About 80% of young adults in the USA use broadcasting as a primary source of news, and 30% use newspapers[4]. Americans watch 38 hours of television per week. Britons are not far behind at 30 hours of TV (2011 average) and 22.5 hours per week of radio.
http://stakeholders.ofcom.org.uk/binaries/research/cmr/cmr12/CMR_UK_2012.pdf p6

New media is changing what people do, but affecting printed media more than broadcasting. Indeed, Internet access has provided new ways to access content originated for broadcast – but instead (or additionally) now accessed either at time of broadcast (through Internet TV and radio) – or accessed later through a variety of catch-up services. Direct viewing of broadcasts still accounted for 88% of TV viewing in 2010, but it was down to 84% in 2011.
http://www.ericsson.com/news/1543649

Key European findings from IAB Europe's Interact conference: 426.9m Europeans use the internet (65%), spending 14.8 hours online each week.
http://www.iabeurope.eu/news/4269m-europeans-online-across-28-markets-%E2%80%A6-from-belgium-to-bulgaria-uk-to-ukraine---europeans-are-more-connected-than-ever-before.aspx

More detail on the European countries can be found in the report "MEDIA USE IN THE EUROPEAN UNION"
http://ec.europa.eu/public_opinion/archives/eb/eb76/eb76_media_en.pdf

You Tube shows the huge involvement in media production as well as consumption at the individual, with:
- over 800 million unique user visit each month
- over 4 billion hours of video watched each month
- 72 hours of video uploaded every minute

The statistics are enormous because the Internet is global while most broadcasting retains a national focus, and because YouTube itself has become a 'platform of choice' for most of the world:
- 70% of YouTube traffic comes from outside the US
- YouTube is localized in 43 countries and across 60 languages

YouTube statistics are from http://www.youtube.com/t/press_statistics

For the purposes of this report on the value of European media archives, the point is that the dominant use of the Internet is no longer text; rather people are continuing their absorbtion in recorded sound and recorded moving images, but using a new technology as the mechanism. The wax cylinders and reels of film have become Internet and mobile. Internet and mobile are thus not 'new media' in themselves, so much as new carriers for people's

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[4] Pew Research Center for the People & the Press, December 2008. http://people-press.org/report/479/internet-overtakes-newspapers-as-news-source

long-established interest: hearing and seeing interesting content (such as the content held in Europe's audiovisual archives). The commercial implications of 'old media accessible as new media' are explored next.

5.2.3   Commercial value

The issue of the commercial value of audiovisual archives is being examined as part of Deliverable D6.3.2 of PrestoPRIME and will also become available as a paper for the PrestoCentre Foundation. In anticipation of that paper being published in late 2012 (the same rough time scale as this report), this paper will just give some bare statistics and reference the draft deliverable for a full investigation.

- D6.3.2 (2012) points out that audiovisual content should be recognised as part of "the worldwide media and information market, one recent private (by Price Waterhouse Coopers) evaluation placing that market size at **$1.3 trillion**. This valuation - by global teams of accountants - looks beyond three-screen (TV, internet, mobile) forecasts to study in detail all markets, platforms, and channels for audiovisual content"
- the European media industry has been valued by a 2012 report at **275 billion US Dollars** (210 billion Euros) per year (http://www.live-pr.com/en/recently-released-market-study-media-r1049355707.htm)
- The Screen Digest International 2010 report on "The Global Trade in Audio-visual Archives" found that the trade in content from TV archives was worth **364M Euros** in 2009, and had been growing at nearly 8% pa over the previous five years (Screen Digest International 2010 "The Global Trade in Audio-visual Archives" http://www.screendigest.com/reports/201074c/10_08_the_global_trade_in_audio_visual_archives/view.html)

It's a long drop from US$1.3 trillion to €364m million. The point is to show the size of the potential market in comparison to current sales into that market by audiovisual archives.

But commercial value represents only the short-term, immediate benefits from greater access to audiovisual content. The public value is considered in the next section.

5.2.4   Public value

Goods and Value: The word 'goods' comes from an association between a thing (or a service) and a value – a 'good' has value to people: it can be sold in a marketplace because of its value.

Public Goods: Not everything that people want and need can be reduced to a standard good, virtual or otherwise. There is a category of public goods, defined as:

"Things that can be consumed by everybody in a society, or nobody at all. They have three characteristics. They are:
*   • non-rival – one person consuming them does not stop another person consuming them;*
*   • non-excludable – if one person can consume them, it is impossible to stop another person consuming them;*
*   • non-rejectable – people cannot choose not to consume them even if they want to.*

Examples include clean air, a national defence system and the judiciary. The combination of non-rivalry and non-excludability means that it can be hard to get people to pay to consume them, so they might not be provided at all if left to market forces. Thus public goods are regarded as an example of market failure, and in most countries they are provided at least in part by the government and paid for through compulsory taxation."
www.economist.com/research/economics/alphabetic.cfm?term=publicgoods#publicgoods

Broadcasting clearly satisfies the first two characteristics, and it is a common complaint about media in general that we can't get away from it, so broadcasting has at least strong elements of being non-rejectable.

In consequence, most citizens of European countries are faced with paying a licence-fee or tax to support public broadcasting: a public good like clean air. In return, the purpose of broadcasting is to "inform, educate and entertain". www.bbc.co.uk/aboutthebbc/purpose/

Broadcasting is an overall public good, but the edifice of broadcasting is built up, piece by piece, by the individual programmes produced and transmitted. Now, for the first time ever, the totality of these programmes – the "entire good" – can (so far as technology goes) be made available through Internet access to digitized broadcast archives.

The major problem with opening broadcast archives is the difference between a good (of the ordinary sort, virtual or otherwise) and a public good. Somehow the overall public good represented by broadcasting is not, generally, seen as a sum of individual public goods. Instead, the archive contents are seen as commercial objects – ie ordinary goods, with rights holders vying to get their share of the market value of these goods.

The DPImpact project took an economists view of public good and digital preservation, in their report Socio-Economic Drivers and Impact of Longer Term Digital Preservation (D.5 Final Report http://cordis.europa.eu/fp7/ict/creativity/publications_en.html http://cordis.europa.eu/fp7/ict/creativity/dpimpact-final-report.pdf) They describe the Contingent Valuation (CV) method for assessing public value in monetary terms. It is a survey method which "circumvents the absence of markets for public goods by presenting the respondents with a hypothetical market, in which they have the opportunity to 'buy' or 'bid for' the good in question." [p91]. As an example of the power of the approach, they refer to a CV assessment of the public value of the British Library:

> *"According to an independent study [Spectrum Strategic Consultants, 2004] on the economic impact of the British Library, the institution's net value contribution to the UK economy is in the order of magnitude of 280 million GBP per annum (450 million Euros).*
> *In financial terms, it shows a Return on Investment of 4.4 times the annual public funding of the institution. British Library revenues from commercial services provided mainly to businesses is slightly over 40 million Euros per year." [p92]*

They go further. Considering 'memory institutions' (MI) as a whole, they cite:

> *According to the study commissioned by the EC in 2006 on The Economy of Culture in Europe* [Study on the Economy of Culture in Europe; KEA European Affairs, Media Group (Turku School of Economics) and MKW Wirtschaftsforschung GmbH. http://ec.europa.eu/culture/key-documents/doc873_en.htm]*, the European culture &*

creative sector, which includes the MI, shows a large economic relevance. Results from this pioneering study show that: from the point of view of its contribution to wealth and employment, culture outperforms other key industries: while over 2 million people work directly for the automotive industry – one of Europe's key industrial sectors – in 2003, creative industries employed a conservative 5.8 million people, 3.1% of total EU25 population. From the perspective of wealth creation, the mentioned EC study estimates that Turnover of European cultural industries amounted to EUR 654 billion in 2003, while the car manufacturing industry amounted to EUR 271billion. Cultural industries contributed to 2.6% of EU GDP in 2003. Finally, the study reports that overall cultural industries growth between 1999 and 2003 is 12.3% higher than the growth of general European economy for the same period. [pp 93-94]

For a detailed analysis of open access, public goods and public value, the reader is referred to the monograph The Value of the Public Domain by Rufus Pollock, Institute for Public Policy Research, July 2006. http://www.ippr.org/publication/55/1526/the-value-of-the-public-domain

5.3   The Future of Broadcast Media

5.3.1   Broadcasting and publishing

With the internet and new media, broadcasting is changing in a fundamental way: from real-time access to 'anytime access'. In so doing, formally broadcasting becomes a form of publishing. The following table is quite general, because it considers the most fundamental characteristics of media: whether they are person to person or more general, and whether or not they operate in real time.

Table 1. Four categories of media.

Media Characteristics	one-to-one	one-to-many
real time	Telephony	broadcasting
non real time	messaging: post, email, SMS	publishing

The fundamental change for broadcasting is simply the disappearance of 'the schedule' and the consequent emergence of archived content as simply 'everything a broadcaster has produced'.

Publishing in this categorisation includes many things: cinema, recorded music and Internet as well as conventional book, newspaper and periodical publishing.

There is much 'new technology' that is not mentioned at all in this classification: mobile reception, hand-held devices, home media storage and networks, electronic replacements for large sectors of print publication (e-journals, e-books, even whole e-libraries), smart phones, apps, e-book readers and on and on. They are all there, jostling for attention -- but not changing the classification, or even expanding the fundamental possibilities: a printed novel is "mobile", and has been for centuries.

This shift (away from the dominance of the schedule) opens a new technical possibility: **public access to all that a broadcaster has produced**, not just the current schedule or the last week's catch-up service. This technology arises from:
1. a combination of broadband connections to home and mobile devices;

2. a general move to online access to content, creating pressure for access to all of a public-service broadcaster's content and simultaneously creating pressure for changes in rights and rights management to allow that access.

However this possibility opens within the general category of publishing, and outside of the historical definition of broadcasting.

There is really only one thing left for broadcasting to lose: the schedule. So long (and only so long) as there is transmission of content to some form of wide distribution, at set times, then broadcasters will still be broadcasting.

What has broadcasting to gain? **Viewers who are not looking at content in real time can be looking at content over all time.** The totality of broadcast content – the accumulation of everything that has been preserved from the beginning of broadcasting – can become available to the user. Whether 'the schedule' remains or not, a broadcaster can point (somehow) to all its own past output, the sum of all past schedules. Exactly as the importance of the schedule diminishes, the importance of the *accumulation of content* increases: as we cease to watch what has been arranged, at the times arranged – so we develop the capacity to follow a trajectory of our own making. We will do this, because the technology makes it possible.

In this view, accessing what once was called *broadcast content* will not be a choice between scheduled content and archived content. There is no need to choose between real-time and archived access, for people who have cut their real-time ties, who do not operate in real time. For these people, it is all one uniform body of content, spread along a time dimension but not tied to real time access.

In this view, a broadcaster makes content and viewers select content – and that's it. Book publishing works this way. Rights need to be changed, but that process has already started as a requirement for 'opening the archive'. The new kind of rights agreement should be seen as more like a book-publishing agreement: the broadcaster produces or procures an item of content, and then publishes it (on demand) forever.

For public-service broadcasters, the *goods* they produce are in a special category:
- the content is of national and international significance,
- often (legislation varies across Europe) the broadcaster is its own *library of deposit*,
- the broadcaster needs to maintain permanent URLs to reach the content,
- the broadcaster needs to collect user-generated information and support social networks formed around the content.

All of that happens around the "totality of the broadcaster's output", the running integral of the broadcast schedules – an accumulation of content that historically was called 'the archive' but which is not the archive of the broadcaster, it defines the broadcaster: the sum of its goods.

Access to the accumulated content is exactly comparable to access to all the books on Amazon. Media access changes: instead of a few hours per day of new broadcast content augmented by limited amounts of pre-selected archive content, the user/purchaser/media-

professional can search a wide and diverse catalogue of media content, built up over decades (with new content being *published* daily).

5.3.2   Serious access

One problem broadcasting has always faced is that is has been seen a 'just entertainment'. Even for news, a major part of broadcasting, the 'organ of record' is invariably a nations most serious newspaper. A broadcaster may have the audio and even the video of a major speech, but the citation to that speech would be to a newspaper .

Serious exploitation of broadcast and other audiovisual archives requires a change of attitude – and one major technology development. The attitude change is to recognise broadcasting aa a primary source of the historical record, not 'just entertainment'. The technical development is a guarantee of access to this record (and similarly to commercially-exploitable content) – which means that the online files arising from digitisation need to be made accessible *using permanent URLs.* It is hopeless for audiovisual content to be accessible only through haphazard arrangements of hundreds of separate websites, each with no proper mechanism to guarantee any form of permanance.

Europe has the answer, and is already implementing it for digitised text: Europeana. The combined catalogues of the digitsed contents of Europe's national libraries is now accessible in one place: Europeana. Additional technology has been added to make a great improvement in the discoverability of that catalogue data, as will be explained in the separate section on Europeana and metadata (Section 6.2 , below).

For permanent access to European content, two things are missing:
- tight controls to ensure against broken links. The URLs to the actual files cannot be left entirely to the hundreds of individual institutions which now contribute to Europeana.
- digital preservation of those files – which is also left entirely to the individual institutions.

Solving these two issues will not be easy. This paper doesn't argue that the issues are easy – only that these two steps are necessary of there will be no such thing *European content* to exploit, commercially or otherwise.

For commercial exploitation, there has to be a quick and effective way to get from the data in Europeana to the completion of a commercial transaction – and there is much to be done to make a commercial Europeana (€peana).

Finally, for exploitation via Europeana of Europe's audiovisual content, Europeana needs to acquire such content – and at present it has very little.

The essential block to both 1) commercial exploitation and 2) significant amounts of broadcast content is the same thing in both cases: rights. A 'will to see' and a 'will to sell' needs to be made manifest if there is to be a European-level exploitation of the unique European public service archives.

Failing progress by Europeana in the area of commercial access to audiovisual archives, progress will be piecemeal. Perhaps that is the safe and natural route. In any case, individual archives will probably need to undertake commercial agreements with outside investors. We may not welcome Google or Getty or Corbis buying up European archives (any more than we

welcome Robert Moldavi buying European vineyards), but we can be careful and enlightened about the agreements that are signed. This issue – commercial partnerships – is considered in detail in D6.3.2 (2012).

5.4   The Nature of European Media Collections

In the following sections we present statistics about how much content is in European audiovisual collections. Overall there is an estimated 50 to 100 million hours, and there are more statistics about how much is audio, video and film – and about its storage and condition, and programmes for conservation and digitisation.

These statistics don't give any information about the nature of the content. A million hours of recordings by a state broadcaster of the speeches of minor party officials is not of the same value as a million hours representing the widest possible selection of current events and popular culture.

Before jumping into the statistics, we should at least attempt a glimpse of what is at stake. Broadcasting recorded the 20th Century, but that period is so recent and broadcasting is so pervasive that it is hard to generate a sense of the real treasure that we have accumulated.

Consider centuries before the 20th. If broadcast technology had existed, an arts programme would have interviewed Shakespeare, and possibly run a special programme when Shakespeare and Cervantes died on the same day. We could have been treated to Meet the Borgias instead of the MTV programme Meet the Osbournes. We would have vox pop interviews with people quarantined in a plague, or under siege, or being transported to Australia for petty theft. Somebody would be sticking a microphone up to people on the gallows. Probably there would be a lot of rubbish. And then there would be two minutes of Jean d'Arc. Dear reader, please consider any single instant from the beginning of the human race up until 1888 that you wish had been recorded, and then remember that we have, in broadcast archives, those commensurate instances from the 20th Century.

5.4.1   Size and condition

The most comprehensive study of audiovisual content in Europe (or anywhere else, for that matter) remains the TAPE study (Klein and de Lusenet, 2008) based on a 2005-2006 questionnaire with nearly 400 respondents from 34 countries. Most were archives (38%), followed by libraries (22%) and museums (11%).

Broadcast archives completely dominate the statistics on size of collections, to the extent that the TAPE study had to separate broadcast archives from all the others in order to get any revealing analysis of all the non-broadcast collections.

> "Of the 0.9 million hrs of film, 9,4 million hrs of audio, and 10,5 million hrs of video that the respondents in the survey quantify, the major share is concentrated in a handful of extremely large collections (national audiovisual archives, broadcasters, deposit libraries)." p xii, Summary and conclusions

Over half of the film, 515 000 hours, was in the six broadcast archives, leaving 380 000 hours spread over the other 146 institutions – and an unknown amout of film in the hands of the 67 responding institutions that were unable to say how much they held. [Table 3-2]

For audio, 15 broadcasters held 3.7 million hours out of the total of 9.4 million. [Table 3-5]. The remainder was with 273 institutions (and 38 were unable to say).

All film is analogue by definition, but audio can be on analogue carriers (such as gramophone records or open-reel tape) or on digital media such as CD, DAT or minidisc. The survey found that 81% of audio was analogue, and 19% was digital. The material is digital, but **not** in files. The amount of archived audio existing as files on mass storage was somewhere within the 0.3% of 'other' formats, in 2005-2006.

Regarding video, nine broadcasters held 3,7 million hours out of the total of 10,5 million. The rest was held by 268 respondents, with 35 unable to give data on their total holdings. As with audio, in 2005-2006 there were negligible amounts of file-based video. The proportion that was analogue was 83%, and the rest was on a variety of digital formats – everything but files [Table 3-11].

The prognosis for all this content was poor in the 2008 report, and there is little to indicate that the situation is any less dire in 2012. Two-thirds of the respondents had NO preservation programme at all [Section 4.1.1], although in national heritage institutions the figure reduced to 40%. In 80% of the largest institutions material was kept in climate-controlled conditions, but half of the small institutions (500hours or less) had no such controlled storage. [Table 4-2]

Further, half the material existed in only a single copy [Figure 4-3]. When that copy deteriorated, only 15 to 30% of institutions (it varied according to whether the material was audio, video or film) had a systematic programme to make a 'new master'. Further, only 25% of institutions had a systematic programme of digitization [Figure 5-2].

Europe's moving image and sound content is at risk. The TAPE survey (Klein and de Lusenet, 2008, p125, Table B3) showed that half of all collections are small (5,000 items or less) and don't have the resources for undertaking their own digitization projects.

Further, a PrestoPRIME analysis of the TAPE data (Wright, 2010, pp.7–8) showed that after a decade of digitization of analogue holdings (at 1.5 per cent per year = 0.28 million hours per year) and new digital intake (at 6 per cent per year for broadcast archives) there would still be more analogue than digital content: the analogue holdings (if removed from archives after digitization) would have dropped to 13.3 million hours, and the digital would have risen to 11 million hours. Unless the rate of digitization increases, at 0.28 million hours per year the analogue holdings will take a further 48 years to digitize.

In summary:
- in 2006, audiovisual holdings were 84% analogue: 16 million hours (of high-value, carefully selected and documented material in formal collections)
- the rate of digitisation was 1.5% per year (TAPE and PrestoSpace both found this figure);
- at that rate, the analogue holdings as of 2006 will complete their digitisation in 2073;
- but 30% of content will become unreadable every decade from the combined effects of obsolescence and decay, a rate of loss that is twice as high as the rate of digitisation;
- the bottom line is: the two effects will meet around 2030, when 33% of content will have been digitised, and 67% will have become unusable .

Unless the rate of digitisation is significantly increased, we can expect to lose two-thirds of the analogue content that was on the shelves of formal collections in 2006.

The figure of 30% loss of content per decade is an approximation, and probably an underestimate. It is based primarily on the known rate of decay of tape, as established by the Image Permanence Institute. They publish tables showing life expectancy as a function of age and storage conditions. The 30% figure is based on 80% of the material in good storage and so doesn't take into account the 50% of small collections that don't have controlled storage. Nor does the figure take into account the obsolescence of equipment and lack of trained staff. The true rate of loss from all factors could easily by 50% per decade. This paper is not going to devote extensive effort to determining the exact figure, because the most important statistic is not rate of loss (which can't be easily changed) but rather the rate of digitisation – which can be changed. **The issue is not whether to estimate loss as 30% or 50% per decade, but to do something about the 1.5% of material which is digitised per decade.**

Finally, surveys from the Presto projects and TAPE looked at material in formal collections: the known problem. The Casey (2009) survey in one university showed there is a major problem with material that is scattered, unidentified, undocumented and not under any form of preservation plan. Casey found 600,000 items at Indiana University, double the amount in their documented collections.

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There is a need for these scattered and unknown materials to be identified. The goal is for all institutional holdings of moving image and sound content to be covered by a preservation strategy. The first step is to find and document those holdings. A full description of a suggested process, with real examples, is available from the PrestoCentre.
http://www.prestocentre.org/library/resources/tutorial-making-preservation-strategy
http://www.prestocentre.org/library/resources/tutorial-collection-strategy-and-preservation-plans

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5.4.2   The unique European advantage

Broadcasting has, by far, the largest amount of audiovisual content in Europe. TAPE found that over half the film, 40% of the audio and 35% of the video was in 15 broadcast archives (including the national broadcast arhives of France and The Netherlands).

What is not evident in the TAPE survey (because it only surveyed European countries) is these huge broadcast collections are largely a European phenomenon. These collections are possible because of public service broadcasting: national broadcasters funded by European citizens. Where broadcasting is mainly commercial, as in the USA, the archived content is scattered. The main broadcast news collection has been recorded off-air by one private university, Vanderbilt in Tennessee http://tvnews.vanderbilt.edu/ . The major broadcasters did not have comprehensive policies, leading to a situation where many long-running individual

programmes have their own archive; an example is the Johnny Carson show
http://www.johnnycarson.com/Default.asp

NBC news has a large archive, but accessible for commercial use rather than research.
http://www.nbcuniversalarchives.com/nbcuni/home/nbcnews.do
However older material (up to 1977) has been deposited with the Library of Congress, and
various forms of documentation are on microfiche. http://www.loc.gov/rr/record/recnbc.html

A search for a current affairs topic in the 1970's or 1980's would have to look at the individual
broadcaster's archives (ABC, CBS, NBC) plus Vanderbilt plus Library of Congress, and much
of the material would be undocumented or inaccessible except by a personal visit. Getting a
playable copy of a single could involve a major expense. This situation has been carefully
documented in the Jeff Ubois paper on accessing US television history "Finding Murphy
Brown" (Ubois, 2006). The paper shows the complicated tangle around materials that were
twenty-five years old – a long time in broadcasting but a very short time from an historical
perspective. The paper concludes: "Without a dedicated effort to collect, catalog, preserve,
and serve them to the public, televised events such as the Murphy Brown – Dan Quayle
interaction will remain difficult to access, or be lost entirely." (Ubois, 2006, p17).

In Europe we have collected and catalogued this heritage, and the major collections have
also done much to digitise and preserve the content. Hence the unique opportunity for
Europe: **to make the audiovisual record of the 20th Century available and exploitable
online, because European public service broadcasting has created this record.**

5.5   Investment in European media collections

In this section we gather the data on the costs – and benefits – of digitisation of European
heritage.

5.5.1   Digitisation

The high-profile report by the "Comité des Sages" on Bringing Europe's Cultural Heritage
Online has been widely noted (Niggeman et al, 2011). The report includes a numerical
estimate of the cost of digitisation of European cultural heritage, prepared by the Collections
Trust and using data from TAPE and the Presto projects, and from ENUMERATE. The cost
estimate is a product of two factors:
 (1) the amount of material;
 (2) the unit cost of digitisation of that material.

There is uncertainty in both areas, so the results as given have a rather large possible error.
The data for the unit cost of digitisation of video, for instance, varied from €55/hr for
'broadcasters' to €418/hr for 'art museums'.There are two immediate problems:
 (1) the figures vary by an 8:1 ratio;
 (2) the figure of €55 per hour is ¼ of the Presto estimate from 2001 (Wright, 2001).

Therefore the costs given by the Comite (Poole, 2010, section 10.7.2) could be high or low by
as much as a factor of four.

However the report still has a clear finding: so far from being the most expensive part of European heritage to digitise, the audiovisual record is actually the least expensive!

Description	Value	Units
Estimated MEAN cost of digitising LIBRARY COLLECTIONS in the EU	19.77	€bn
Estimated total cost of digitising MUSEUM COLLECTIONS in the EU	38.73	€bn
Estimated total cost of digitising NATIONAL ARCHIVES in the EU	41.87	€bn
Estimated total cost of digitising AV COLLECTIONS in the EU	4.94	€bn

[Poole, 2010, Section 11.1.2]

The reason that Europe's audiovisual collections are estimated as costing 1/10 th as much as either national archives or museums is straightforward. Comparatively, audiovisual material is rare. The largest part comes from broadcasting where it is produced at rates approaching €1 milliion per hour http://www.bbc.co.uk/commissioning/tv/how-we-work/business-requirements/tariff-ranges.shtml . Even so-called low cost entertainment begins at €20 thousand per hour. Production is then followed by an archive selection procedure, so only content deemed of significant value is retained indefinitely. In this context, value means both historical value and business value (meaning potential for re-use by the broadcaster).

The result is that there are relatively few items in broadcast archive compared to major memory institutions. The Collections Trust figures are as follows:

Description	Value	Units
Libraries: Books	80	million
Rare books	7	million
Newspaper pages	540	million
Maps	7	million
photographs	9	million
Museums: MAN-MADE objects	265	million
NATURAL SPECIMEN suitable for digitisation	221	million
WORKS OF ART	75	million
PHOTOGRAPHS	350	million
Total archive material pages remaining to be digitised	10.45	billion
Archive holdings of MICROFORMS	690	thousand
Archive holdings of PHOTOGRAPHS	8	million
Estimated total number of hours of AV in EU cultural institutions	24	million

[Poole, 2010; Overview, pp 8-10]

All this content is of value, as it has all already gone through a selection process in order to get into these institutions. This paper will not argue that audiovisual content is more culturally valuable than the other content. We have already argued that broadcast content has suffered from being undervalued as 'mere entertainment' (Section 5.3.2 , above). What can be demonstrated is that when audiovisual content is re-used commercially, the price is in tens to hundreds of dollars (or Euros or pounds sterling) **per second.**
http://www.videomaker.com/article/12658

Many kinds of museum and archive data has a commercial value, such as census results and other public records data. People with an interest in family history are quite willing to pay for access to such data, which in turn has let archives into commercial agreements whereby

the private company pays for digitisation in return for certain exploitation rights. The potentially large resale value of audiovisual content is also an area ripe for commercial partnerships between public institutions and private companies. This whole area of digitisation and exploitation activity is thoroughly reviewed in D6.3.2 (2012).

5.5.2   Rights

UK copyright and general intellectual property law was recently reviewed (Hargreaves, 2011). Copyright law has always included exceptions, and an important part of the Hargreaves review is detail on digital 'exceptions' to support archiving, teaching and non-commercial research. Hargeaves has also promoted easier clearance of archive material through blanket agreement and through an electronic clearinghouse (Digital Copyright Exchange) supporting automation for right clearance.

These areas are contentious: an increase in exceptions can remove barriers to use of archive material, but it is viewed by commercial footage libraries as a potential loss of income. The Federation of Commercial Audiovisual Libraries (FOCAL) has commented strongly on various areas of the Hargreaves, generally expressing concern about both exceptions and about blanket agreements (Best, 2012). As an indication of the complexity of attempts to change copyright legislation, there were 471 formal responses to this UK review (http://www.ipo.gov.uk/pro-policy/consult/consult-closed/consult-closed-2011/consult-2011-copyright/consult-copyright-response.htm).

At the European level there has also been a Green Paper (European Commission, 2011) on the online distribution of audiovisual works, and JISC responded to both these developments (JISC, 2011).

A US report on recorded sound (Bamberger and Brylawski, 2010) has a major section on US rights as they affect preservation and access (pp.108–137). Within Europe, the Arrow project is developing a registry system for orphan works (Caroli and Scipioni, 2012). PrestoPRIME has developed a structured vocabulary (ontology) for the description of rights and rights contracts pertaining to the broadcasting industry as well as an expression language: a formal language suitable for automation of rights clearance (Boch et al, 2012).

Rights are seen as a limitation, but rights should also be seen as 'the right to make money'. The problem is to convince rights holders of the opportunities as well as the threats. The progress toward electronic access is inexorable, as file-downloads and now ebooks have shown. However, in addition to commercial rights there are pervasive rights associated with cultural heritage material. Basically, these rights are centred around a general feeling by European citizenry that they own the content in heritage instutions: it belongs to the people, and they have the right to see it and enjoy it.

The whole issue of heritage content and public access, and a UK initiative to create a new form of non-commercial access, is presented in the next sectiond.

5.5.3   Commercial activity and the *digital public space*

In the UK various public bodies are working together on public access. Co-ordinated by the British Film Institute (BFI, 2011) as the UK Sound and Vision Collections group, the BFI, BBC, the National Archives, the Imperial War Museum, the National Media Museum, the National Library of Scotland, the National Library of Wales and National Museums Northern

Ireland are developing the concept of a Digital Public Space (JISC, 2010; McRoberts, 2011 and 2012). Issues of rights have plagued the efforts of many institutions to provide public access to heritage and public service material. These partners are developing a non-commercial part of the Internet where rights concerns can be met, while also meeting public desire for access to their content.

The first results of the UK Digital Public Space is a multi-institution arts website The Space http://thespace.org/. It describes itself as "a new, deliberately experimental service, managed by Arts Council England and developed in partnership with the BBC. It has been designed to give arts and culture organisations the opportunity to experiment and engage with new and existing audiences in a completely innovative digital environment."

The emphasis is on placing content where people can access it. They claim to be responding to a situation where "only about four per cent of the hundreds of organisations funded by the Arts Council are creating and producing high quality digital content for a variety of platforms."

Over recent years the Presto series of projects have been documenting the relevance and importance of online access, where online and Internet were used rather interchangeable. *The Space* is serious about reaching much wider areas of new technology, with the following commitment:

> *"The Space is available across all four key digital media platforms; PCs, smartphones, tablets and internet connected TVs (tv.thespace.org). The service is also available as a ... video on demand service via Freeview HD ... and Freesat ...".*

Rights clearance for Internet access has been seen as a barrier, but The Space is providing Internet and mobile (3G) and broadcast (Freeview and Freesat). This initiative demonstrates what can be done by being bold – and fast. One suspects that one way it cleared rights for all these Internet alternatives and supplements was simply by "moving in" before the barriers had been erected.

5.6   Conclusions

Audiovisual content is enjoyable and valuable. It is only because broadcast content is so widely used (television viewing of several hours per day per person, across much of the globe) that it is hard to add 'highly prized' after 'enjoyable and valuable'. Audiovisual content is beginning to dominate the Internet, and the trends are all upward.

Audiovisual content lends itself to electronic access: to sale, pay-per-view, footage sales and other commercial opportunities – and there is potential for commercial investment to pay for digitisation (for preservation and access) as described in D6.3.2 (2012).

However Europe has a unique advantage: public service broadcasting has created the national holdings of many millions of hours in the French and Dutch national audiovisual archives (INA and B&G) – and has created 'million-plus' archives from individual public service broadcasters (BBC, RAI, ORF, SVT, several in Germany) and two dozen more '100 thousand plus' national public service archives across the rest of Europe.

These are well constructed archives of valuable content, generally well-documented and mainly in good condition. Hundreds of millions of Euros have been invested in the preservation and digitisation of these archives.

However much remains to be done:
1. **completing the job for large public service archives**: after ten years the BBC has digitised about half its video, half its audio and less than a quarter of its film.
2. **coordinating access to the results, to gain a European advantage**: EUScreen and its predecessor projects have pioneered multinational, multilingual non-commercial access to highly selected European broadcast content. Europeana has shown how tens of millions of items can have common access. Can Europeana now expand to significant amount of audiovisual content? If that content is digitised through commercial partnerships, can Europeana work effectively with commercial access?
3. **much more preservation activity in small archives:** this paper has forecast that at our current rate of digitisation activity, by 2030 it will all be over: 1/3 of current shelf-based audio and video will safely be in files, and 2/3 will be unreadable and lost.
4. **film is special:** under proper storage, it will be viewable in 2030 and perhaps half of it will still be in reasonable condition in 2130. However the whole film world is in the midst of huge and rapid changes: Kodak in bankruptcy proceedings, film projection disappearing in European cinemas in just a few more years, the manufacture of film digitisation equipment remaining a risky and volatile business. Digital film is no happy solution, but it has a more predictable future than for 'film as film' – and so even for film there needs to be much more digitisation to offset the risks of disappearance of conventional film stock and film technology.

It has not been the purpose of the Presto series of projects to provide a clarion call for European funding. Presto has promoted effecient digitisation workflow, and better technology for reading, digitising and managing audiovisual content. Presto has also documented the problem and worked with other projects (TAPE, ENUMERATE) and organisations (FIAT-IFTA, IASA, AMIA, UNESCO) to improve our knowledge of the size and shape of the problem to be faced. Presto produced the first numerical estimates of European and global audiovisual content and its preservation status, back in 2001 – and the series of annual reports has tracked progress.

The Presto work has been funded by the partners and by the Research and Development stream of European Commission. Further R&D may still be relevant to audiovisual preservation, but the real issue now is large levels of pubic and commercial access – and the attention and further funding that such access can bring.

It remains to be seen if that access will happen at an individual institution level (with, for instance, the BBC going its own way regarding both access and further work on digitisation) or whether there will be a genuine European integrated exploitation of this valuable content. If there is to be a European-level response, it is hard to imagine that Europeana would not be central to that development. The next section looks at Europeana and audiovisual access.

6   EUScreen, Europeana and Access

In the early days of the Presto series of projects, now ten years ago, the phrase 'preservation and access' was sometimes referred to as 'one long word' – because of the close links between the two. A great increase in the potential for access was the major visible result of digitisation. Rather than requiring people to come within the walls of an archive or other heritage institution, the access could in principle be electronic – *creating access* (the strap line of the VideoActive project). Electronic access using Internet (and now mobile) technology defies all the laws of physics: travel at the speed of light, content available in many places at the same time – indeed the ability for content to walk through walls.

After a decade of growth of access, with the launch of tens of thousands of hours of online content by major institutions, such as INA and B&G, it can now be seen that access is not just the equal partner of preservation, but really access is primary: without the prospect of access, things just don't happen and funding for digitisation is difficult or impossible. Without the proceeds (in terms of interest, exposure or actual commercial income) from access, further digitisation remains difficult or impossible.

This section of the report is devoted to developments in access. The general situation has been covered by the excellent reports from the EC-supported EUscreen project, summarised in the next section. The particular issues of Europeana, metadata visibility and European-level exploitation are covered in the section after that (6.2).

6.1   EUscreen

Past annual audiovisual preservation status reports from PrestoSpace and PrestoPRIME included coverage of developments in access. The launch of INA's 'Archives pour tous' as the first major (10 000 hours) free and open collection of online broadcast content was covered, as were the BBC's Creative Archive project and the launch under the EC Content+ programme of the Birth of Television and Videoactive projects.

But the Presto series of projects were R&D projects that did not focus specifically on access, but on technology for 'preservation and access'. Now EUscreen is providing its own annual reports specifically on access to video, in particular television and all that television has evolved into with the rise of Internet and mobile technology.

In consequence, the best sources of general coverage on access for the two years up to mid-2012 are from EUscreen: van den Heuvel and Baltussen (2011) and Verbruggen and Oomen (2012).

The 2012 report had three main sections:
1. Major Trends in Online Access to Audiovisual Content: a section looking first at developments in online access, and then focussing specifically on progress in moving archive content online
2. Towards a Cultural Commons: a detailed look at *open access* as implemented for broadcast archive content, including coverage of technical developments eg HTML5 and Linked Data

3. Topics in the (European) Research Arena: where technology hits access, including future development of the Internet, hybrid television (combining broadcasting with Internet), mobile technology and 3D.

This 2012 EUscreen report did not cover rights issues, but 2012 activity in review of copyright legislation and in implementing progress on preservation of orphan works has been covered in this PrestoPRIME report, see Section 5.5.2 , above.

6.2   Europeana

The motivation for European heritage funding for access was based in part upon representations from the heads of national governments (France, Germany and others) that 'something must be done' about the fact that Internet access was not access to European content – and instead was largely pointing to US content. It was quickly realised that Europe could not make a Euro-Google, and instead in created Europeana – a portal for European heritage.

However Google and other search engines are a fact of life. The only straightforward way to increase access to European content is to 'raise the ranking' of European hits in search engines. Commercial websites understand this perfectly, and strategies for increasing ranking and visibility are now a major issue. There is a wide range of tools, advisors and consultants that will endeavour to increase the visibility of web-based content. The primary requirement is that metadata pertaining to the content has to be at least to some degree visible (to search engines) in the first place. Metadata that is inaccessible to search engines (so-called dark metadata) can never have its visibility improved, because so far as search engines are concerned the metadata does not exist.

One major category of dark metadata is information in databases, including library catalogues. Search engines search web pages, not databases. For this reason, in general any online data that is in a catalogue is invisible: the technology that builds the data used by search engines cannot find the catalogue data. The so-called crawlers or (even better) spiders that search web-space search for web pages. These crawlers are just computer programmes, so they don't operate the interfaces used to search online catalogues.

The result is simple: bibliographical data is invisible – unless something is done to make it visible to crawlers / spiders.

This topic – visibility of bibliographical data – is technical, and solutions are generally beyond the capability of small institutions. Here is where Europeana plays a crucial role. Once Europeana has aggregated metadata, Europeana can also operate on that metadata in a variety of ways, including applying technology that opens the data to search engines.

The solution to making a library or archive catalogue visible is simple in concept: a computer programme is run that has access to the whole catalogue, and has some method or map allowing it to access, one by one, every entry in the catalogue. It then creates a pseudo web page (an artificial page, never seen by a person) and interacts with the crawlers from the major search engines (Google and others) to ensure that the data is read by the engine. This last point is tricky, as the interaction has to hand over, to the search engine, a set of terms and an associated real (not pseudo) URL. When someone looking for content types a search term into Google or another search engine, a match against the Europeana terms then

displays a URL to the relevant bibliographic entry inside the Europeana database. Thus the Europeana data has been opened up to the search engine.

As an example: there is a bust of August Strindberg by Ville Valgren at the Finnish National Gallery, a Europeana member. A search for <Ville Vallgren bust "August Strindberg"> finds the desired item on the first page of Google results (fifth item) – as a Europeana entry! There are no hits directly to the Finnish National Gallery, because (presumably) it is the transfer of bibliographic data from the Finnish Gallery to Europeana, and the work of Europeana to expose that data to search engines, that has allowed the search for this portrait bust to succeed, and succeed so easily.

The importance of Europeana goes beyond making bibliographical data visible. Once the data from hundreds of institutions has been collected in one place, a whole range of technology can be applied, with several advantages:
1. technology can be used that wouldn't be easy or even possible for an individual archive to implement, such as the tools to create pseudo-pages from bibliographical data and ensure that web-crawlers index such pseudo-pages;
2. technology can be applied in a uniform way across all the aggregated data; this is particularly important in areas such as controlled vocabularies: they could hardly be called controlled if the implementation were left to hundreds of individual databases;
3. technology can be applied across the aggregated data to produce results (such as semantic relationships) that depend upon an analysis of a European-scale corpus of data. Links between content in hundreds of different archives can only be made once the documentation of those archives has been aggregated.

These advances of Europeana are remarkable and significant, but there are two further areas where Europeana must do much more, if it is to be the instrument whereby Europe exploits its European advantage regarding large public-service broadcast archives:
1. time-based metadata
2. commercial exploitation

Exploitation in the Internet world comes down to being found: by search engines in the first place, and from there (for commercial use) to websites that actually handle rights, take money and supply content.

The Metalabs (www.metalabs.tv/) project in Ireland has shown how time-based content (video in their examples) can increase its exposure to search engines by factors of 100, by describing (annotating) specific parts of the video along the time dimension, and exposing all that description to search engines. The process requires, again, pseudo-pages – this time creating something like key-frames at every point in time where time-based annotations are placed, and then ensuring that search engines acquire the resultant metadata and associated URL. The whole process is explained in a video by Simon Factor (Factor, 2010).

Once content is found, it can be watched or listened to, and thereby release public value. However commercial value requires access to be followed by a transaction, and here is where the bibliographic metadata of Europeana needs to be complemented by rights metadata and the tools needed to complete an online monetary transaction.

The technology need not all appear at once, because to begin with the user of Europeana can be referred back to the originating institution for commercial follow-up. In practice, the

sorts of institutions which contribute to Europeana are not set up for footage sales and general commercial exploitation, though that situation is changing rapidly, particularly in the area of image sales.

The major open question is: will the *European advantage* – the large public service archives – be exploited individually, or would INA and RAI and B&G and BBC and dozens more combine commercial activities? And if they could or did, would Europeana or some commercial arm of Europeana be that European umbrella organisation? Certainly Europeana has the most advanced tools for metadata aggregation and exposure to search engines, but it has at present little audiovisual content, and no standing in the commercial footage sales world. A crucial factor in the future of Europeana, and of European audiovisual content and the *European advantage,* will be the next steps of the major audiovisual archives which have worked with Europeana: INA and B&G. If they developed a commercial 'route to market' via Europeana, or even just with metadata and search engine support from Europeana, that could serve as an example to smaller broadcast archives across Europe.

7   *UK, European and International Developments*

This section in past annual reports is another area, as with Brief Encounters, where more timely and comprehensive information is provided by PrestoCentre through its website, rather than by waiting for this annual report.

The PrestoCentre website has a News section, which in 2012 covered (amongst many other items) the following developments:

- The Corporation for Public Broadcasting moves forward with the American Archive project OCTOBER 1, 2012
- The Internet Archive launches TV News Search & Borrow SEPTEMBER 24, 2012
- Open Planets Foundation SCAPE Project Highlights Audiovisual Asset Management Tool SEPTEMBER 13, 2012
- One Year Later: A Global Reflection on Ian Hargreaves' Digital Opportunity Report JULY 16, 2012
- Italy's Luce-Cinecittà teams up with Google to digitise more than 100,000 films JULY 9, 2012
- EU Council makes conclusions on the digital and online future of European cultural material MAY 25, 2012
- Advancing the Cloud: EU Commission releases report on the future of cloud computing MAY 11, 2012
- Saving and Scrapping - How to Preserve and Dispose of Personal Digital Archives APRIL 3, 2012

8   Glossary

Term	Definition
4:2:2	The allocation of digital samples to the luminance (black and white) dimension and to the two chrominance (colour) dimensions in the digital representation of video, as used in the ITU Rec. 601 standard
AMIA	Association of Moving Image Archives
viewing proxies	Access copies of digital content, usually in reduced quality but smaller files, faster to transmit over networks or the Internet
A-D Strips	Technology to detect amounts of acetic acid
AMPAS	Academy of Motion Picture Arts and Sciences
AMWA	The Advanced Media Workflow Association, an industry body with a focus on ensuring that standards are implement so that they are truly interoperable
analogue recordings	The recording method is an analogue of the original signal: a groove in a vinyl disc is the analogue of the sound pressure into the microphone that eventually produced the groove
asset management system	Software that organizes a collection of files, usually including separate metadata and search and edit tools
AVI	a wrapper format used by Microsoft
AXF	an 'archive exchange format' under development http://www.openaxf.org/ . It is a *container* (cf), a step up in power and complexity from a file
B&G	Beeld & Geluid (National Institute of Sound and Vision), the Dutch national audiovisual archive (holding mainly broadcast content)
bandwidth	The frequency range of a signal, from lowest to highest frequencies
BBC	British Broadcasting Corporation
betacam, betacamSP, betaSP	Varieties of the last Sony analogue videotape format
BFI	British Film Institute
bias signal	A frequency above the range of human hearing, used in recording on analogue audio tape
bit (b), byte (B)	In audiovisual media, data rate for real time playback is measured in bits per second, while file size is measured in bytes; to convert: storage in bytes per hour = ½ of data rate in bits/sec, times 1,000. Example: CD audio at 1.4 Mb/s takes 0.7 GB per hour for storage; this conversion is 90 per cent accurate (overestimates storage)
BL	British Library
born digital	Files that did not come from digitizing an analogue source
Broadcast WAV format, BWF	The EBU standard for a WAV file, with extra metadata;
BUFVC	British University Film and Video Council
carrier	Something physical that can hold the content
CCAAA	The Coordinating Council of Audiovisual Archives Associations, an umbrella body representing eight archival bodies with a major interest in audiovisual collections: ARSC, AMIA, IASA, ICA, FIAT, IFLA, FIAT-IFTA and SEAPAVAA
CD, CD-ROM	Optical media for audio and general data; stores about 0.7 GB
clone	An exact copy of a digital object
codec	The abbreviation for coder/decoder
coder	The method (software) for assigning numbers to a signal
coding	The process of assigning numbers to a signal using a coder
colour video	A combination of a black and white (luminance, brightness) signal and a

Term	Definition
	separate signal giving colour information
component	Any method of handling video that uses a separate signal, either as a brightness signal separate from two colour signals, or as three colour signals (red, green, blue)
composite	A video signal that mixes brightness and colour information into one signal
concealment	Replacing a missing line or group of lines or even an entire frame of information by using a previous line, lines or frame
conservation	Keeping what you have without changing it
container	A container can hold multiple files of various kinds. Containers are one solution to the problem of making files themselves more complicated.
datacine	A device for digitization of film. Originally there were telecine machines that made (in real time) a video signal from film. Data cine machines make a file instead of a video signal and do not have to run in real time, allowing them to have higher optical resolution.
data tape	Magnetic tape that holds numbers
dB, decibel	A unit of measurement of the relative amplitude of signals. When one signal is twice as large as another (equivalently, has one more bit) it is approximately 6 dB greater; human hearing has a range of about 120 dB; background noise causes a usable range of about 70 dB; the best analogue recording equipment has roughly a 70 dB dynamic range, while an audio CD with 16-bit word length has a 96 dB range (6x16)
decoder	The reverse of the method used by a coder
decoding	Using a decoder to get an unencoded (plain) signal
Digibeta	The Sony professional digital videotape format
digital intermediate	A digital representation of film frames, used in restoration, animation, computer graphics and computer-generated images
digital recordings	Stored representations of signals, using numbers
digitization	The process of assigning numbers to analogue signals
DVD, DVD-ROM	Optical media for video and general data; a basic DVD stores about 4.7 GB, though larger amounts are now possible
dynamic range	The range between maximum size of a signal and either the minimum size or the noise level (whichever is greater); the word length (number of bits) of a sample limits the dynamic range (to approximately 6 dB per bit)
EBU	European Broadcasting Union, an industry association
embedded metadata	Metadata carried within a file
encoder	The same as coder
encoding	The same as coding
FIAF	International Federation of Film Archives
FIAT	International Federation of Television Archives
file	A unit of digital storage. It is surprisingly hard to know what exactly a file is; everything we do with files relies upon multiple levels of technology to create what a file is and does; a file is a performance
fixity check	A method for ensuring the integrity of a file http://digitalpreservation.ncdcr.gov/newtodp.html and http://archivematica.org/wiki/index.php?title=Overview
flash memory card	Storage with no mechanical or moving parts, as in a memory stick
Front Porch	A company making asset management and digitization equipment
hard drive	Also disc or spinning disc; magnetic storage using spinning discs
high definition, HD	The new standards for television, usually 720 or 1080 vertical lines instead of

Term	Definition
	576 (onscreen) lines for standard UK TV
Hz	Hertz; cycles per second, the unit of frequency measurement
IASA	International Association of Sound and Audiovisual Archives
INA	Institute national de l'audiovisuel, the French national audiovisual archive (holding mainly broadcast content)
interlaced	Television reduces visual flicker by sending images in two halves: the odd numbered lines and then the even numbered ones, allowing the rate of screen refreshment to be doubled, without increasing the overall data rate
ITU Recommendation 601, or Rec 601 for short	The digital video standard from the International Telecommunications Union, a standards body
JISC	Joint Information Systems Committee, the infrastructure body supporting UK higher education
JPEG	A (compressed) coding and file type for images, developed by the Joint Images Expert Group
JPEG2000	An updated JPEG codec, which includes lossless coding and supports video as well as still images
k, M, G, T, P	Kilo, mega, giga, tera, peta are the prefixes used to describe large numbers, increasing by a factor of 1,000 for each step in the series: 10 GB is 1,000 times as much as 10 MB, and a million times as much as 10 kB. When dealing with computer memory the factor is 1,024, not 1,000, and the capitalization of k is used inconsistently
lossy encoding	Representing a signal with less data. The representation is only approximate, with a measureable difference between the original and the lossy version, though the difference may not be perceptible
LTFS	Linear Tape File System, and file-management system for LTO data tape. http://www-03.ibm.com/systems/storage/tape/ltfs/
master	The reference version of an object; version with the highest quality
memory stick	A storage device using solid state memory
mezzanine format	A computationally efficient way to produces access proxies may be to use a version that is not the master version, but instead is encoded in a way that supports production of proxies
minidisc	A digital audio recording and storage method from Sony
MOV	A wrapper format used by Apple and associated companies
MXF	A SMPTE standard wrapper used in broadcasting, digital cinema and other professional contexts
OAIS	Open Archival Information System Reference Model (ISO 14721), a general standard for digital preservation (CCSDS 2002)
PAL	Literally, Phase Alternate Lines. The UK colour TV composite video standard reverses the phase of the colour information on alternate lines, allowing the TV receiver to produce correct colour information despite phase variations in the transmitted signal (a very common problem, caused for instance whenever a plane passes nearby)
preservation	'Preservation is the totality of the steps necessary to ensure the permanent accessibility – forever – of an audiovisual document with the maximum integrity' (Edmondson, 2004)
preservation action	An intervention in the life of content, taken in order to keep the content usable; digitization is one such action
preservation factory	A concept promoted by the Presto series of projects, involving use of division of labour and other industrial techniques in order to make digitization 'better,

Term	Definition
	faster, cheaper'
Presto, PrestoSpace, PrestoPRIME, PrestoCentre	The Presto series of projects, running from 2000 to 2012 and culminating in the PrestoCentre Competence Centre
quality (of a recording)	An estimate of how closely a recording matches an original signal, as assessed by physical measurements (mainly bandwidth and dynamic range) and perceptual judgements
Rec. 601, properly ITU Recommendation 601	The digital video standard from the International Telecommunications Union, a standards body
recording (of a signal)	A way to make a permanent version of signal
restoration	Changing a recording to correct defects
rip, ripping	The process of moving data from a non-file format (audio CD, video DVD) into a file format
SAMMA	A robotic system for digitizing cassette format videotape
sampling rate	How often number are assigned to a signal, usually given in units of thousands of samples per second; sampling rate controls the upper limit to the bandwidth of a digitized signal
scrubbing	Checking files on a storage system for errors
SDI	Serial Digital Interface, the wiring system for ITU Rec 601 digital video; sometimes used interchangeably with Rec 601
signal	For our purposes, a variation against time. Sound is a variation in air pressure (over time); the variation can be captured by a microphone to produce a time varying voltage, a signal that is the analogue of the original sound; video is also a signal, and film definitely is not a signal
SMPTE	Society of Motion Picture and Television Engineers, a professional and standards body
standard definition, SD	The lines per frame for video that has been used in the UK from the 1960s, with 625 lines total, 576 being visible
sticky shed	A problem with ageing magnetic tape where the oxide starts to come off the tape (shed) and causes the playback device to momentarily stick (again and again), and eventually jam
TBC	Time base corrector; a specialist device that restores the timing of a video signal played back from videotape
Temporary Archiving	A concept promoted by PrestoSpace (2006); a recommended roadmap for format change and migration; the principle is to capture the bandwidth and dynamic range of an analogue original, and then move in steps to an uncompressed format
TIFF	A compressed format for image files; TIFF can be lossless or lossy
time code generator	A device that makes a new time code, possibly in response to codes recovered from an old recording, in order to put time code without defects into a new recording
TDR	trusted digital repository
UNESCO	United Nations Educational Scientific and Cultural Organization; UNESCO is a major stakeholder in heritage and preservation issues
URL	Universal Resources Locator; a web address, such as http://www.w3.org/TR/2012/WD-url-20120524/
vinegar syndrome	http://www.filmpreservation.org/preservation-basics/vinegar-syndrome (formation of acetic acid from acetate based film)
WAV file	The standard wrapper for audio; see Broadcast WAV Format for the professional variant

Term	Definition
word length	The number of bits in the digital representation of the amplitude of a signal
wow	A defect in recorded audio resulting in a slow, cyclic variation in speed or amplitude, or both
wrapper	A method of packaging a coded signal and all related signals and information into a file: commonly video with multiple tracks of audio plus time code, subtitles and metadata; see MXF, MOV, AVI

9   References

Bamberger, R. and Brylawski, A., 2010. *The State of Recorded Sound Preservation in the United States: A National Legacy at Risk in the Digital Age.* Council on Library and Information Resources and The Library of Congress, Washington, D.C.
http://www.clir.org/pubs/abstract/reports/pub148

Best, H., 2012. *Response by the Federation of Commercial Audiovisual Libraries to the Hargreaves Copyright consultation*.   http://www.ipo.gov.uk/response-2011-copyright-focal.pdf

Boch, L,. Di Carlo, A. and Gallo, F. 2012. *Model, Format and Services for Audiovisual Rights Management.* in Nesi, P. and Santucci, R. Proceedings ECLAP 2012 Conference on Information Technologies for Performing Arts, Media Access and Entertainment, Florence, Italy, 7–9 May. Florence: Firenze university press
http://www.fupress.com/Archivio/pdf%5C5185.pdf

Caroli, C. and Scipioni, G., 2012. *ARROW: Accessible Registries of Rights Information and Orphan Works Towards Europeana.*   D-Lib Magazine, Volume 18, Number 1/2

Casey, M., 2009. *Media Preservation Survey*; Bloomington: Indiana University Bloomington
http://ovpr.indiana.edu/communications/media_preservation/
http://ovpr.indiana.edu/communications/media_preservation/iub_media_preservation_survey_FINALwww.pdf

D6.3.2 (2012) (in preparation) *Embracing the Market: The Business of Audiovisual Archives in the Digital Age.* PrestoCentre White Paper

European Commission, 2011. *Green Paper on the online distribution of audiovisual works in the European Union: opportunities and challenges towards a digital single market.*
http://ec.europa.eu/internal_market/consultations/2011/audiovisual_en.htm

Factor, S. 2010. *Video: Simon Factor from MetaLabs presenting at the NDRC Annual Report Launch.* http://www.ndrc.ie/videos/simon-factor-from-metalabs-presenting-the-ndrc-annual-report-launch/

Hargreaves, I., 2011. *Digital Opportunity: A Review of Intellectual Property and Growth.* Intellectual Property Office, London. http://www.ipo.gov.uk/ipreview See also
http://www.ipo.gov.uk/hargreaves.htm

van den Heuvel, W. and Baltussen, L. B., 2011. *D7.6.2 Online Access to Audiovisual Heritage Status Report*. Hilversum, EUScreen
http://www.pro.europeana.eu/documents/864473/864500/EUscreen+D7.6.1+OnlineAccessto AudiovisualHeritageStatusReport.pdf

JISC, 2010. *The UK's National Digital Library – A Digital Public Space*.
http://digitisation.jiscinvolve.org/wp/2010/11/02/uk-national-digital-library/

JISC, 2011. 1) *Copyright – response to Green Paper on the online distribution of audiovisual works in the European Union*; 2) *Copyright – responses to the Hargreaves Review.* 3) *Implementing the Hargreaves Review of Intellectual Property and Growth: Implications for UK Further and Higher Education* http://www.jisc.ac.uk/news/Onlinenewsroom/Statements.aspx

Klein, E. and de Lusenet, Y., 2008. *Tracking the reel world: a survey of audiovisual collections in Europe.* Amsterdam: European Commission on Preservation and Access. www.tape-online.net/docs/tracking_the_reel_world.pdf

McRoberts, M., 2011. *BBC Digital Public Space project.* London, BBC. www.bbc.co.uk/blogs/bbcinternet/2011/04/bbc_digital_public_space_proje.html

McRoberts, M., 2012. *Digital Public Space: Data Guides.* London, BBC. http://www.bbc.co.uk/blogs/bbcinternet/2012/04/digital_public_space_data_guid.html

Niggemann, E., De Decker, J., Lévy, M., 2011. *The New Renaissance.* Report of the 'Comité des Sages' reflection group on bringing Europe's cultural heritage online. http://ec.europa.eu/information_society/activities/digital_libraries/comite_des_sages/index_en.htm

Poole, N., 2010. *The Cost of Digitising Europe's Cultural Heritage.* A Report for the Comité des Sages of the European Commission. London, Collections Trust. http://ec.europa.eu/information_society/activities/digital_libraries/doc/refgroup/annexes/digiti_report.pdf

Ubois, J., 2006. *Finding Murphy Brown: How Accessible are Historic Television Broadcasts?* Journal of Digital Information, Vol 7, No 2. http://journals.tdl.org/jodi/article/viewArticle/172

Verbruggen, E. and Oomen, J., 2012. *D7.6.2 Online Access to Audiovisual Heritage Status Report.* Hilversum, EUScreen http://pro.europeana.eu/documents/864473/82a7fb98-6be2-4572-b211-e1656837f6f1

Wright, R., 2001. *Broadcast Archives: Preserving the Future.* Proceedings of the International Cultural Heritage Informatics Meeting, Milan. http://presto.joanneum.ac.at/Public/ICHIM%20PRESTO%2028_05_01.pdf

Wright, R.. 2010. *PrestoPRIME Deliverable D7.1.3 Audiovisual Digital Preservation Status Report.* Paris, PrestoPRIME. www.prestoprime.org/project/public.en.html

10   Appendix: Digital Preservation References

- PrestoPRIME: 100 Million Hours of Audiovisual Content: Digital Preservation and Access in the PrestoPRIME Project http://eprints.soton.ac.uk/271071/
- PrestoCentre: http://www.prestocentre.org/
- Open Planets - http://www.openplanetsfoundation.org/
- DPC - http://www.dpconline.org/
- DCC - http://www.dcc.ac.uk/
- DPC Technology Watch Report 'Preserving Moving Pictures and Sound', - http://dx.doi.org/10.7207/twr12-01
- Digital Preservation Europe (DPE) briefing: Preservation of Digital Audiovisual Content http://www.digitalpreservationeurope.eu/publications/briefs/audiovisual_v3.pdf
- JISC advice: http://www.jiscdigitalmedia.ac.uk/tags/category/digital-preservation/ http://blogs.ukoln.ac.uk/jisc-beg-dig-pres/content/what-exactly-do-i-need-to-preserve/jisc-project-outputs/audio-visual-material/
- IFLA-PAC special edition on audiovisual preservation: http://www.ifla.org/files/pac/IPN_47_web.pdf
- AHDS article: DIGITAL MOVING IMAGES AND SOUND ARCHIVING STUDY http://www.jisc.ac.uk/media/documents/programmes/preservation/movingpicturesandsoundarchivingfinalversion.pdf
- Planning Beyond Digitization: Digital Preservation for Audiovisual Collections by Kara Van Malssen on Nov 17, 2010 http://www.slideshare.net/kvanmalssen/planning-beyond-digitization-digital-preservation-for-audiovisual-collections

Products:
Open Source:
- NARA: https://github.com/usnationalarchives
- PrestoPRIME:
  - LTFSArchiver http://www.crit.rai.it/EN/attivita/opensource/index.htm
  - storage and service planning and monitoring: http://prestoprime.it-innovation.soton.ac.uk/
  - metadata tools: http://prestoprime.joanneum.at/

Commercial:
- Ex Libris Rosetta - http://www.exlibrisgroup.com/category/RosettaOverview
- Tessella Digital Preservation - http://www.digital-preservation.com/
- Tessella Safety Deposit Box - http://www.digital-preservation.com/wp-content/uploads/SDB4.pdf

JISC links to Digital Media and Digital Preservation Organisations
http://www.jiscdigitalmedia.ac.uk/crossmedia/advice/links-to-audiovisual-and-digital-preservation-organisations