



InterPARES 2 Project

International Research on Permanent Authentic Records in Electronic Systems

Title: Digital Moving Images: Annotated Bibliography

Status: Draft (public)

Version: 1.0

Submission Date: November 2004

Release Date: September 2007

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URL: http://www.interpares.org/display_file.cfm?doc=ip2_biblio_dig_mov_images_annotated.pdf

The Digital Realm

Bearman, David. “Realities and Chimeras in the Preservation of Electronic Records.” *D-Lib Magazine*, Volume 5, Number 4 (April 1999). Available from: <http://www.tjdl.cn/dlib/www.dlib.org/dlib/april99/bearman/04bearman.html>

This article argues against the use and implementation of “emulation” for the purpose of preserving electronic records.

Bearman, David and Jennifer Trant. “Authenticity of Digital Resources.” *D-Lib Magazine*, June 1998. Available from: <http://www.tjdl.cn/dlib/www.dlib.org/dlib/june98/06bearman.html>

This article addresses the issue of authenticity of electronic records. The authors emphasize its importance and discuss specifically some proposed technological solutions aimed at maintaining electronic records’ authenticity.

Lyman, Peter. “Archiving the World Wide Web.” From *Building a National Strategy for Preservation: Issues in Digital Media Archiving, Commissioned for and sponsored by the National Digital Information Infrastructure and Preservation Program, LOC April 2002.* Available from: <http://www.clir.org/pubs/reports/pub106/web.html>

This article does not specifically discuss digital moving images.

This article is a comprehensive treatment of the major issues and problems in preserving the electronic documents found on the world-wide-web. It explicitly discusses the maintenance and preservation of the authenticity of electronic documents within the discussion of metadata (in the section “The Authenticity and Provenance of the Object Collected”). The article also contains an analysis of migration and emulation as preservation techniques.

Masanes, Julien. “L'information technique nécessaire à la préservation à long terme des documents numériques = Technical information needed for long-term preservation of digital documents.” *International preservation news: a newsletter of the IFLA Programme on Preservation and Conservation = Internationale Nachrichten der Konservierung = Les nouvelles internationales des preservation = Mezhdunarodnye novosti konservatsii*, no. 29 (2003 May), pp. 11-19. [English + French.]

This article does not specifically discuss digital moving images.

The article cites the OAIS (Open Archive Information System) model and ISO standard (14721:2002) as model tools for endowing “digital documents” with proper metadata. The author draws a distinction between “representation information” (RI) and “preservation description information” (PDI), both of which necessarily have a bearing on authenticity. Various metadata initiatives are described as are the common preservation difficulties of working in the digital realm.

Rothenberg, Jeff. *Avoiding Technological Quicksand: Finding a Viable Technical Foundation for Digital Preservation*. Council on Library and Information Resources. [January 1998]. Available from: <http://www.clir.org/pubs/reports/rothenberg/contents.html>

This is a comprehensive text treating the general issue of digital preservation. Rothenberg is a major proponent of emulation as a solution.

_____ . *Ensuring the Longevity of Digital Document*. Council on Library and Information Resources [1995]. Available from: www.clir.org/pubs/archives/ensuring.pdf

This oft-cited article presents in a semi-technical manner the major issues and problems relating to preserving electronic/digital records.

Smith, Bernard. "Preserving tomorrow's memory: preserving digital content for future generations." *International preservation news: a newsletter of the IFLA Programme on Preservation and Conservation = Internationale Nachrichten der Konservierung = Les nouvelles internationales des preservation = Mezhdunarodnye novosti konservatsii*, no. 29 (2003 May), pp. 4-10. English.

The author argues that given the current volume of production of digital information its preservation represents a huge social and cultural problem. Among other recommendations, the author argues that general awareness of the problems should be increased, the problem should be understood, and following these, public support should be enlisted in finding solutions.

***The State of Digital Preservation: An International Perspective, Conference Proceedings*. Council on Library and Information Resources. Washington, D.C.: Documentation Abstracts, Inc. Institutes for Information Science, [April 24-25, 2002.] Available from: <http://www.clir.org/pubs/abstract/pub107abst.html>**

The authors address key issues in information science relating to digital preservation, which includes such topics as digital libraries, economics of information, and resources for scholarship. Included are the following essays:

Introduction: The Changing Preservation Landscape, Deanna Marcum

Overview of Technological Approaches to Digital Preservation and Challenges in Coming Years, Kenneth Thibodeau

The Digital Preservation Research Agenda, Margaret Hedstrom

Understanding Digital Preservation: A Report from OCLC, Meg Bellinger

Update on the National Digital Infrastructure Initiative, Laura Campbell

Experience of the National Library of the Netherlands, Titia van der Werf

Digital Preservation—A Many-Layered Thing: Experience at the National Library of Australia, Colin Webb

Good Archives Make Good Scholars: Reflections on Recent Steps Toward the Archiving of Digital Information, Donald Waters

Tristram, Claire. “Data Extinction.” *Technology Review*, Oct. 2002, Vol. 105, Issue 8, p.36.

This article does not specifically discuss digital moving images.

This article presents to the general reader the major social and cultural issues associated with digital preservation. Methods of preservation such as emulation, migration, and encapsulation are explained and discussed. Includes commentary from Rothenberg, Bearman, Lorie, Smith.

Digital Moving Images

Agnew, Grace. “Developing a Metadata Strategy.” *Cataloging & Classification Quarterly*, Vol. 36, number 3 / 4 (2003): 31-46.

Covers the steps to building a metadata repository, including modeling the information needs of one’s community, selecting and adapting a metadata standard, documenting metadata, populating a database and sharing metadata with other initiatives. In addition, advances and options for metadata for multimedia, particularly video, are presented.

Arms, Caroline R. “Keeping Memory Alive: Practices for Preserving Digital Content at the National Digital Library Program of the Library of Congress.” *RLG DigiNews*, Volume 4, Number 3 [June 15, 2000]. Available from: <http://www.rlg.org/preserv/diginews/diginews4-3.html#feature1>

This article is an overview of the major issues and initiatives in digital preservation at the Library of Congress. It briefly mentions the issues and actions taken concerning the preservation of digital moving images, but defers a more detailed discussion to the National Audio-Video Conservation Center’s prototype development activities.

AV Preservation Trust=Le Trust Pour La Preservation de l’AV. *An Assessment of Options for Creating Enhanced Access to Canada’s Audio-visual Heritage. Feasibility study*. Prepared by Paul Audley and Associates Ltd. [1999]. Available from: http://64.26.166.43/docs/enhanced_access_e.html

Investigates the feasibility of single window access to information about Canada's audio-visual heritage. The project follows on the recommendations of *Fading Away*, the 1995 report of the Task Force on the Preservation and Enhanced Use of Canada's Audio-Visual Heritage, and the subsequent 1997 report *Search + Replay*.

Besser, Howard. "Digital Preservation of Moving Image Material?" *The Moving Image*, Fall 2001, Vol.1, No.2.

From the author's abstract: "This article first describes some of the technological-induced changes in moving image production and distribution. It then discusses how those changes are altering viewer habits and expectations, and how those in turn affect how we will need to deliver and store moving image materials. Then the article explains the various approaches to preserving digital materials [i.e. emulation, migration, refreshing, etc.]. Finally, the author points to two paradigm shifts that will be likely for moving image preservation: from preserving completed works as a whole to asset management, and from preserving an artifact to preserving disembodied content." Of the oft-cited "Besser problems" ("the translation problem," "the custodial problem," "the scrambling problem," and "the inter-relational problem"), the author discusses in particular the first two in relation to the preservation of digital moving images. Both relate to the maintenance of authenticity.

_____ . "Moving Image Preservation: Analog or Digital?" From 18th Annual Preservation Conference at NARA, 2003. Available from: http://www.archives.gov/preservation/conferences/papers_2003/besser.html

The author outlines the major issues, problems, and initiative concerned with the digital preservation of moving images, i.e. format obsolescence, metadata, etc. All of these topics have a bearing on the authenticity of digital moving images.

NOTE: This document is adapted from a presentation given by the author. It is in note/slide form.

Butler, Ann E. "Encoded Archival Description Tag Library, Version 2002 (review)." *The Moving Image* 3.2 (2003) 119-122

This article discusses the adequacy of Encoded Archival Description (EAD) 2002 as a descriptive tool for moving image materials and thus has a bearing on the discussion of authenticity. The author notes that "EAD 2002 remains a descriptive standard geared toward paper-based and mixed-format archival collections" and calls for further development of the standard to accommodate moving image material.

Breeding, Marshall. “Building a Digital Library of Television News.” Available from: <http://search.epnet.com/direct.asp?an=9876101&db=aph>. Also available in PDF, *Computers in Libraries*, June 2003, Vol 23, Issue 6.

This article is a brief overview of the processes involved in establishing a digital archive of television news videotapes at the Vanderbilt Television News Archives in the USA. The author examines some technical aspects of converting and preserving the videotape into a digital format; explains the different phases of the project, such as the creation of metadata and the establishment of the digitisation process; and provides an overview of the costs and challenges facing the project.

British Library Research and Innovation Centre. *Comparison of Methods & Costs of Digital Preservation: British Library Research and Innovation Report 106. A consultancy study conducted by Tony Hendley, Technical Director, Cimtech, University of Hertfordshire, 1998.* Available from: http://www.ukoln.ac.uk/services/elib/papers/tavistock/hendley/hendley.html#_Toc422714317

This paper is a comprehensive treatment of the issues of digital preservation as they presented themselves in 1998. The paper defines generally the different types of digital records and information that must be preserved. Among these types, the author discusses digital video, the context of its creation and preservation, implicitly dealing with authenticity within his treatment of emulation, migration, technological obsolescence, etc. [The programme of studies is guided by the Digital Archiving Working Group, which reports to the Management Committee of the National Preservation Office.]

Davis, Ben. “Digital Storytelling.” *Razorfish Reports #24, June 16, 2000.* Available from: http://reports.razorfish.com/frame.html?rr024_film

This brief article for the general reader traces the arc of the moving image preservation paradigm. Authenticity is implicitly discussed throughout.

Depocas, Alain, Jon Ippolito and Caitlin Jones (eds.). *Permanence Through Change: The Variable Media Approach = L'approche des médias variables : la permanence par le changement.* New York; Montreal: The Solomon R. Guggenheim Museum; The Daniel Langlois Foundation. 2003. [English and French.] Available in PDF from: http://variablemedia.net/e/preserving/html/var_pub_index.html

A collection of essays concerned with the preservation of variable media art, which includes digital moving images.

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Fleischhauer, Carl. “Looking at Preservation from the Digital Library Perspective.” *The Moving Image* 3.2 (2003) 96-100.

_____. “Audio and Video Preservation Reformatting: A Library of Congress Perspective.” From 18th Annual Preservation Conference at NARA, 2003. Available from: http://www.archives.gov/preservation/conferences/papers_2003/fleischauer.html

The author recounts the issues and problems identified and the methods used to deal with such in describing the past and current practices undertaken at the Library of Congress. The discussion has some bearing on maintaining the authenticity when digitizing moving image material but most of the document concerns maintaining authenticity in the digitization of audio material.

NOTE: This document is adapted from a presentation given by the author. It is in note/slide form.

Ford, Piers. "The Perils of Digital Preservation." *VNUNET.com: UK Technology News, Reviews and Downloads*. Available from: <http://www.vnunet.com/Features/1137956>

This article is a non-technical discussion of the social, cultural, and financial issues surrounding digital preservation. Authenticity is implicitly discussed in the author's account of the ongoing preservation of the BBC's Domesday book (1986), in which migration, emulation, and "migration on demand" are tools used and developed. It does not specifically address preservation of digital moving images.

Freiling, Rudolf. "Storage & Space: Notes on Collecting, Archiving, and Presenting Digital Moving Image Works." *The Moving Image*, Fall 2001, Vol.1, No.2.

Friedlander, Amy. "Summary of Findings." From *Building a National Strategy for Preservation: Issues in Digital Media Archiving, Commissioned for and sponsored by the National Digital Information Infrastructure and Preservation Program, LOC April 2002*. Available from: <http://www.clir.org/pubs/reports/pub106/summary.html>

This article is the summary of findings from a project undertaken by the Library of Congress in which interviews were conducted with various stakeholders concerning collection-management issues in the digital realm, among which the preservation of digital film and television are mentioned. The article is a general discussion of the findings and concerns authenticity in its explicit discussion of various standards (i.e. MPEG), formats (digital and physical), establishing status of transmission (i.e. original v. copy), and the importance of maintaining records' integrity.

Holdsworth, David and Paul Wheatley. "Emulation, Preservation, and Abstraction." *RLG DigiNews*, Volume 5, Number 4 (August 15, 2001). Available from: <http://www.rlg.org/preserv/diginews/diginews5-4.html#feature2>

This article is a discussion and explication of the experimental emulation activities undertaken by researchers at the Universities of Michigan and Leeds (a.k.a. the CAMiLEON project) in preserving the BBC Domesday book. Authenticity is an implicit issue in the discussion.

Humanities Advanced Technology and Information Institute (HATII), University of Glasgow, and the National Initiative for a Networked Cultural Heritage (NINCH). *The NINCH Guide to Good Practice in the Digital Representation and Management of Cultural Heritage Materials*. 2002. Available from: <http://www.nyu.edu/its/humanities/ninchguide/index.html>

This best practice guide is a comprehensive treatment of the issues involved in the digital preservation of non-digital cultural heritage materials, i.e. "digitization" for preservation.

Chapter VII (Audio/Video Capture and Management) provides a broad and detailed discussion of the major issues of digital representation of analogue media, discussing authenticity implicitly in its coverage of sampling rates, metadata, etc. Includes exhaustive array of links.

Hunter, Jane and Sharmin Choudhury. "A Semi-Automated Digital Preservation System based on Semantic Web Services." From Joint Conference on Digital Libraries, (JCDL 2004), Tucson, Arizona, USA. June 2004. Available from: http://metadata.net/newmedia/Papers/JCDL2004_paper.pdf

This paper, discussing “digital objects” but not moving image material specifically, describes “a flexible, dynamic, semi-automated [preservation] approach which leverages existing work on preservation metadata and preservation software tools (e.g., emulation and migration) by integrating them and making them available through a Web services architecture.”

_____ . "Implementing Preservation Strategies for Complex Multimedia Objects" From The Seventh European Conference on Research and Advanced Technology for Digital Libraries (ECDL 2003), Trondheim, Norway. August 2003. Available from: http://metadata.net/newmedia/Papers/ECDL2003_paper.pdf

This paper discusses the problems and issues related to the implementation preservation strategies for multimedia objects. It begins with a brief discussion which covers the currently salient methods of digital preservation (i.e. emulation, migration, encapsulation) and continues with summaries of case studies undertaken by the authors.

Ide, Mary, Dave MacCarn, Thom Shepard and Leah Weisse. "Understanding the Preservation Challenge of Digital Television." From *Building a National Strategy for Preservation: Issues in Digital Media Archiving*, Commissioned for and sponsored by the National Digital Information Infrastructure and Preservation Program, LOC April 2002. Available from: <http://www.clir.org/pubs/reports/pub106/television.html>

Outlines storage problem, includes a review of prevailing criteria for appraisal for selection, standard formats for digital television, asset and rights management, distribution, users, etc. The article also discusses implications for long term storage within which authenticity is at issue. Migration, emulation (noting drawbacks to authenticity for both), and “bundling” are discussed, as are Besser’s longevity problems and Messier’s points for adequate digital video preservation plan.

“Integrity and Authenticity of Digital Cultural Heritage Objects.” *DigiCult*, Thematic Issue No. 1 (August 2002). Available

from: http://www.digicult.info/downloads/thematic_issue_1_final.pdf

This compilation of articles addresses issues of preservation of the integrity and authenticity of digital objects. Amongst the articles are a discussion of what constitutes authenticity, a paper outlining the level at which authenticity should be addressed, a listing of standards and projects, and an argument for cooperation. The journal is illustrated with case studies from traditional archives as well as sound and visual archives.

Marchionini, Gary and Gary Geisler. “Open Video Digital Library.” *D-Lib Magazine*, Volume 8, Number 12 (December 2002). Available

from: <http://www.dlib.org/dlib/december02/marchionini/12marchionini.html>

An overview of the Open Video Digital Library (OVDL) at the University of North Carolina. The article reviews the theoretical and practical goals of the digital library, provides some detail of its makeup, architecture and user interface and notes the digital library's future directions.

Mellor, Phil, Paul Wheatley and Derek Sergeant. “Migration on Request, A Practical Technique for Preservation.” Available as a PDF

from: <http://www.si.umich.edu/CAMILEON/reports/migreq.pdf>

This paper, by CAMiLEON Project Resarchers, “describes advanced techniques of data migration which can be used to support more accurate and cost-effective preservation of digital entities.” [From authors’ abstract.] Authenticity is an implicit issue within a discussion of migration.

Moore, Reagan, , Chaitan Baru, Arcot Rajasekar, Bertram Ludaescher, Richard Marciano, Michael Wan, Wayne Schroeder, and Amarnath Gupta. “Collection-Based Persistent Digital Archives - Part 1.” *D-Lib Magazine*, Volume 6, Number 3 (March 2000). Available from: <http://www.dlib.org/dlib/march00/moore/03moore-pt1.html>

Available from: <http://www.dlib.org/dlib/march00/moore/03moore-pt1.html>

This paper defines an approach for maintaining digital data through the development of an environment that supports migration of collections onto new software systems. Authenticity is an implicit issue.

National Library and Archives of Canada. “Fading Away: Strategic Options To Ensure the Protection of and Access to Our Audio-Visual Memory.” *Report of the Task Force on the Preservation and Enhanced Use of Canada’s Audio-visual Heritage* [1995]. Available

from: <http://www.collectionscanada.ca/04/0417/docs/fading.pdf>

Predates the serious consideration of digital media being the primary creative media or preservation media. Chapter 3 treats “preservation of the audio-visual heritage” and discusses digital media in the future tense.

Seid, Steve. “TechArcheology: A Symposium on Installation Art Preservation.” *MAIN*, Winter 2000. Available

from: <http://www.experimentalstvcenter.org/history/preservation/pretext.php?id=9&page=1>

This document is geared towards a conservation audience. It discusses in a general, non-technical way the various problems and issues facing conservators of moving image material (including digital). Included in the discussion are comments concerning technology obsolescence, migration, and the maintenance of authenticity.

Teruggi, Daniel. “Can We Save Our Audio-Visual Heritage?” *Ariadne*, Issue 39 (April 2004). Available from: <http://www.ariadne.ac.uk/issue39/teruggi/>

This articles outlines the major accomplishments and initiatives involved in preserving and providing access to audio-visual materials in Europe. It outlines the objectives of the PrestoSpace project which is based upon the work of a previous project, Presto.

Thomas, Judith. “Digital Video, the Final Frontier.” *Library Journal*, January 15, 2004. Available from: <http://www.libraryjournal.com/article/CA371213&>

This articles “explains the benefits and challenges of creating a cutting-edge motion media collection.” Authenticity is implicitly discussed in the author’s discussion of the adequacy of MARC and MPEG-7 as descriptive tools for moving image materials.

Turner, James M. “Data Storage Technology Assessment 2000 (National Media Laboratory, a National Technology Alliance/3M National Media Laboratory/National Imagery and Mapping Agency; August 2000).” *The Moving Image*, Fall 2001, Vol.1, No.2.

Wackerman, Ellie, 2001. “Review of Archival Moving Image Materials: A Cataloging Manual.” *The Moving Image* 1, no. 2: 186-189.

L'auteur fait une évaluation critique de l'ouvrage qui en est à sa deuxième édition. Une analyse comparative est effectuée avec la première édition ainsi qu'avec les Anglo-American Cataloging Rules (AACR2). On y fait ressortir les nouveaux ajouts, les points forts ainsi que les limites de l'ouvrage pour le traitement des images en mouvement.

Wactlar, Howard D., and Michael G. Christel. "Digital Video Archives: Managing Through Metadata." From *Building a National Strategy for Preservation: Issues in Digital Media Archiving*, Commissioned for and sponsored by the National Digital Information Infrastructure and Preservation Program, LOC April 2002. Available from: <http://www.clir.org/pubs/reports/pub106/video.html>

This article addresses the question: "How can metadata be produced and associated with video archives to unlock their contents for end users?" It reviews the key problems and concepts that relate to the question of creating and maintaining metadata for digital video and includes a discussion on the major works toward standardization of metadata (i.e. MPEG and Dublin Core). Authenticity is implicitly at issue in this article.

Wright, Richard. "Preserving Europe's Memory: PRESTO shows how to preserve Multi-media in the most cost-effective fashion." *Cultivate Interactive*, Issue 7 (July 2002). Available from: <http://www.cultivate-int.org/issue7/presto/>

This article outlines the PRESTO project which looks at multimedia preservation issues for both analogue and digital media. The project is developing cost-effective and collaborative technologies and workflows for preserving multimedia. The paper treats the preservation of some digital formats and the authenticity issues implied.

Zwaneveld, Ed H. "Audio Visual Standards And Beyond." 18th Annual Preservation Conference at NARA, 2003. Available from: http://www.archives.gov/preservation/conferences/papers_2003/zwaneveld.html

The author discusses within the context of standards the major issues facing those who wish to preserve audio-visual material. The issue of authenticity is implicitly discussed throughout as the author argues against the preservation of media (analogue and digital) in digital form (note section: "Perpetual Migration-It Is An Option From Hell!") and for its preservation in extant formats (i.e. film) proven to last.

NOTE: This document is adapted from a presentation given by the author. It is in full text form with some illustrative slides.

Standards/Technical

Josep Polo, Jose Prados, Jaime Delgado. "Interoperability between ODRL and MPEG-21 REL." From the Proceedings of the First International ODRL Workshop, April 22-23, 2004. Available from: <http://odrl.net/workshop2004/paper/odrl-polo-paper.pdf>

This paper describes the current conflict between the two main Rights Expression Languages (RELs): MPEG-21 REL and ODRL (Open Digital Right Language). It goes on to expose the apparent interoperability between the two languages.

RELS relate to the concept of authenticity in that the data transmitted within these languages are coming to be considered highly desirable in the metadata schemas for digital moving images (because they identify copyright, i.e. creator, author, permissions on content, etc.), which therefore makes them important in terms of establishing and maintaining the identity and integrity of the records they describe. It is in the best interest of authenticity that these languages be interoperable.

Bormans, Jan and Kate Grant, eds. “MPEG-21 Use Case Scenario Document.” International Organization for Standardisation, July 2002. Available from: http://www.chiariglione.org/mpeg/working_documents.htm#MPEG-A

This document describes a number of scenarios in which MPEG-21 may be used. It notes in the specific use cases which areas within the MPEG-21 design and structure would be affected by the particular use. The use cases described accentuate the importance of the various parts of MPEG-21 (a.k.a. ISO/IEC 21000-N), nearly all of which relate to establishing and maintaining a record's identity and integrity (thus authenticity).

Kim, Jeong Hyun, Seong Oun Hwang, Ki Song Yoon, and Chang Soon Park. “MPEG-21IPMP.” Available from: <http://charybdis.mit.csu.edu.au/~mantolov/CD/ICITA2002/papers/177-21.pdf>

This paper addresses issues that have been identified within the scope of MPEG-21 Part 4: IPMP (Intellectual Property Management and Protection). IPMP relates to the identity and integrity of a record. Discussion is essentially technical.

Rightscom, Ltd. “The MPEG-21 Rights Expression Language – A White Paper.” London (July 2003). Available from: http://www.rightscom.com/files/MPEG21_RELwhite_paper.pdf

This paper describes in legal and business terms the rationale for the development of and uses for MPEG REL. Includes a semi-technical discussion.

Nack, Frank. “Everything you wanted to know about MPEG-7 but were afraid to ask: A technical note for the presentation at the 10th DELOS Workshop on Audio-Visual Libraries, Santorini, Greece on 24-25 June, 1999.” Available from: <http://www.iei.pi.cnr.it/DELOS/WORKSHOP/Nack.htm>

Smart, L.J. “OAIS, METS, MPEG-21 and Archival Values.” *The Moving Image*, Spring 2002, Vol.2, No.1.