Digital Preservation and Preservation Via Digitization: 
The Challenges and Accomplishments of Film Preservation in the Digital Era 
An Annotated Bibliography

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**Introduction and Scope:**

The following bibliography covers literature from the past ten years on the preservation of film, with a specific focus on whether digitization can or should be used as a means of film preservation. Film, as a material, is both fragile and volatile. Older films made on cellulose nitrate (which include most of the films produced between 1889 and the mid-1920s) are so chemically unstable that they burst into flames. Despite advances in film’s chemical stability, its disintegration within, at best, a century is a given (Poole, 1999, 3). The imperative to preserve films and the culturally significant material they contain has been of great concern for decades; however, this interest has not culminated in a consensus as to how this should be achieved. The range of opinions, as a result, is broad, with the most vocal purists advocating for the preservation of the original copies of films, and the technological progressives at the other end of the spectrum promoting digitization as a means of preservation. This bibliography will cover the breadth of this debate in scholarly literature from the past ten years (1999-2009). Furthermore, this bibliography includes articles that contextualize where film preservation fits into the practice of preservation as a whole, as well as articles that address the technological issues of digitization and digital data in markedly technological language. This combination of articles is meant to promote an insight not only into film preservation, but also into where film preservation fits into more ideological debates on preservation—its necessity, its purpose, and its best practices.

**Description**

Film preservation differs markedly from traditional preservation practices that dictate the preservation of books and other paper-based material; specifically, film preservation has not developed the guidelines and best practices that have made the preservation of paper-based materials successful (DeStefano, 2003). Film preservation, rather, has been in a state of stasis over the past decades. As a result, the large collections of film in cultural repositories around the world have literally sat behind closed doors in the past decades, and little has been done to either catalog these culturally significant artifacts, or make them accessible to the scholarly community or the public at large (Andreano, 2007). Technological development—and the increased access to digital surrogates of information it has created—has re-invigorated the debate surrounding how
film preservation should proceed. The most controversial aspect of this debate concerns whether digitization can or should be used as a method of preservation, and/or whether digitization should be used as a means of promoting greater accessibility to film archives.

**Summary of Findings**

The preservation of film is a matter of incredible urgency. Film literally comes closer to its demise on a daily basis, as chemical reactions erode the images it contains and threatens the disintegration of invaluable and culturally significant information. The literature on film preservation does not reflect this urgency; specifically, a vast majority of information concerning film preservation still promotes proper storage as the keystone of film preservation, despite the fact this approach has resulted in storehouses of film canisters that are rusting shut, and film that is slowly turning, like old wine, into vinegar (Poole, 1999—also an example of such literature). Slightly more progressive literature suggests that film be copied from one analog format to another—an approach tantamount to putting a band aid on a deep flesh wound.

The rapid development of the internet and digital media in the past years, however, has re-invigorated imaginative new approaches to film preservation. Although this literature is somewhat scant, it offers a new hope for the development of film preservation.

The current debate surrounding the preservation of film concerns the viability of digitization as a preservation method—an approach that has generated, arguably, more skepticism than support. Rapid changes in technologies have made the digitization of film a possibility; the rapidity with which technology changes, however, also poses many dilemmas that call the notion of digitization as a preservation method into question. The notion of technological obsolescence—or that file formats used currently may not be used ten years from now, and furthermore may not be playable on computers ten years from now—calls the longevity of digital data into question. Digital data must be constantly updated to keep pace with the development of new file formats. This concept is put most eloquently by Besser, who observes “we can discover and study 3,000 year old cave paintings and pottery […] but we’re unable to even decipher any of the contents of an electronic file on an 8-inch floppy disk from only 20 years ago” (2001, para. 3). Hunter and Choudhury, furthermore, observe that pieces of multimedia artwork produced on
Software from the 1990s is no longer playable on modern computers, and, in many cases, has been un-recoverable in its original form (2003, 474). This thought—that information could literally disappear, for lack of better term—in the course of less than ten years is a frightening concept. While digital data has the appearance of indestructibility—it is, after all, an abstract and disembodied thing—it is far from indestructible. Digital data needs to constantly be updated so that its contents remain accessible. Hunter and Choudhury (2003) address various approaches to this task in detail. The two main approaches to the preservation of digital data are emulation, in which both the data and the program needed to access its contents are preserved (475). An alternative approach to the preservation of digital data is migration, in which digital data is migrated into more current formats, and the obsolete programs originally used to create and run them are left to fall by the wayside (Hunter and Choudhury, 2003, 476). Opponents of digitization point out that although analog film formats have a lifetime that may not extend a century, that this is far preferable to a format that may last only a few years, a point brought up repeatedly in Gertz (2000).

Gertz (2000), as well as Andreano (2007) and Besser (2001) address the reality that while digitization is not necessarily a preferable form of film preservation, that digitization has the potential to grant unprecedented access to film materials that are, at present, largely inaccessible in their current, analog forms. Gertz (2000) asserts that a hybrid approach to preservation is preferable, in which digital surrogates of information could be made in order to promote greater access to information, while analog copies of the same information could be stored in order to guarantee that an enduring copy of the information exists, regardless of the success or failure in future years to successfully confront the preservation of digital data.

Opponents to this hybrid method of preservation, however, assert that preservation efforts should throw the full force of their efforts into creating digital preservation solutions. In his study of broadcasting archives in Europe, for example, Wright (2004) attacks this hybrid method, in particular as it applies to film, arguing that digitization is a far more efficient and cost-effective means of film preservation; specially, he states that making analog copies of film is a time-consuming and human-intensive process that does not address the film’s inevitable decay. It is, in other words,
means of staving off the inevitable, but not a solution. Digitization, rather, puts film material in a format that can be re-formatted (via either migration or emulation) in large batches—a task that can be accomplished by a computer (Wright, 204, 74). Wright (2004) furthermore asserts that preservation efforts must be consistent with emerging trends. The proliferation of digitized video is a reality, not a science fiction fever dream; digitization is consistent with the trajectory of this trend (74). The need to re-format data in the future, Wright (2004) asserts, should not be used as an argument against digitization as a preservation method, but should rather serve as a motivation to improve standards and practices of digital data preservation (74).

Besser (2001) echoes Wright’s sentiment that the proliferation of digital data should guide current preservation initiatives. The digital production of films, and the emergence of “born digital” major cinematic works will require that systems be put in place to accommodate these digital files, and ensure that digital data be preserved so that these files will remain accessible indefinitely (Besser, 2001). Furthermore, the transformation of moving images material into digital format will be more compatible with paradigm shifts occurring within the practice of film preservation; specifically, the movement away from film preservation as the preservation of an artifact, to film preservation as the preservation of disembodied content (Besser, 2001).

Rubin (2009) adds further credence to this approach of film preservation in her studies of current preservation efforts occurring among public broadcasting stations. Since the implementation of the Deficit Reduction Act of 2005, which mandates that all television stations turn off their analog transmitters and convert to an all digital format, the concept of preservation in broadcasting has undergone massive changes (Rubin, 2009, 394). Specifically, broadcasting from this point forward will be an all-digital format that will require a rapid and effective confrontation of issues like technological obsolescence that threatened the viability of digital data in past years. Her study of one project, in particular, to put together a model repository for digitized moving image content suggests that the development of best practices and other guiding standards for digital preservation are on the horizon. This development, among others, lends new life-blood to the debate over whether digitization can be used as a preservation method for film, and will undoubtedly re-invigorate efforts to further develop programs and initiative
that make this a possibility, and give aging film archives the world over a second change at (digital) eternity.
BIBLIOGRAPHY


Abstract: Throughout history, scholarly interest in moving image archives has rarely extended beyond academics involved in film studies, leaving a wealth of human experience captured on film and video hidden from the more general scholarly community. Taking as its premise the idea that accessible catalogs with comprehensive content descriptions are the key to establishing a link between scholars and moving image archives, this article attempts to illustrate the importance of content description before exploring how content is currently described and how to best capture it in the future. By looking at the limitations of current cataloging practices and speculating on the usefulness of new technology and emerging cataloging methods, such as user-created metadata, this article is intended to foster a better understanding of the need to provide access to audiovisual content, so that it may be seriously considered if moving image archives are to throw open their doors to the scholarly community as they enter the digital age.

Annotation: This article examines the logistic impediments that have prevented scholars from actively seeking out moving image material in their research, with a particular focus on shortcomings in cataloging and accessibility that have effectively isolated film archives for decades. Moving image material, ranging from broadcast footage to documentaries, provides an invaluable record of human experience over the last century; however, the value of this material is negated by its inaccessibility. Moving image material—in particular, material in analog format—must be catalogued by hand; as such, cataloging moving image material is prohibitively expensive and time-consuming. As a result, moving image material in archives often has insufficient metadata, or is not cataloged altogether. As a result of this dearth of information about the moving image material in film archives, this material is largely un-searchable; furthermore, procuring copies of analog material for scholarly research is difficult to point of near impossibility.

Andreano asserts that comprehensively cataloging moving image material is a preliminary step in making this information accessible for scholarly research, and examines a variety of innovative approaches and case studies regarding how this might be achieved.

Andreano also recognizes that digitization has the potential to play a vital role in promoting the accessibility of moving image material. The digitization of information in the past decade has created an unprecedented level of accessibility, and the digitization of moving image material has the potential to open up film archives to scholarly research. Moving image digitization coupled with emerging automatic metadata creation technologies, furthermore, has the potential to eliminate the exhaustive process of human-generated metadata for moving image materials, and could potentially lower the high costs associated with moving image cataloging.
Andreano concludes, however, that moving image digitization is within the realm of possibility, but still out of reach, and that sufficient cataloging is the first logical step in making moving image material more accessible.

**Search Strategy:** Footnote chasing in Gracy and Cloonan (2003) led me to find the publication *The Moving Image*; this article was found while browsing the contents of *The Moving Image*.

**Database:** Academic OneFile.

**Method of Searching:** Footnote chasing, browsing.

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**Abstract:** N/A

**Annotation:**
This publication was originally produced for the ARL Preservation of Research Library Materials Committee, and reviews the potential of digitization as a method of preservation. Although the paper focuses primarily on digitization as a method of preservation for fragile and/or rare paper-based documents, the paper also recognizes that digitization has the same potential benefits for non-print resources. These benefits include increased access and distribution capabilities, the creation of master copies of rare and invaluable items, and increased user satisfaction. Furthermore, Arthur et. al. urge that digitization is a crucial step institutions must take to stay relevant in a world that is increasingly digital, and that institutions that fail to make digital surrogates of their holdings available will be “orphaned” over time (4). Arthur et. al. also observe that in the digital era, libraries must adapt how they operate in order to fulfill their social role as “society’s stewards of cultural and intellectual resources,” and must, therefore, “approach preservation in a new way” (4).

Arthur et. al. also make the observation in the course of this publication that while there are many standards in place for the digitization of paper resources, comparable standards for non-print resources such as moving image and sound are, to date, non-existent, or at least not standardized.

**Personal Note:**
This article re-iterates, albeit in the different context, many of the points made in other scholarly research on the subject of digitization as a means of preservation, both in general in and in the case of moving images in particular. Two examples that immediately came to mind are: the similar arguments presented by Gracy (2007) on the impact of the increasingly digital resources on the social function of libraries and other
cultural repositories, and the observation in Lopatin(2006) and DeStefano (2003) that standard guidelines for the digitization of film are generally non-existent, which stands in stark comparison to the well-developed standard practices that now guide and dictate the digitization of print resources.

Search Strategy: This article is cited in Lopatin (2006).

Database: ARL website.


Abstract: Digital imaging and broadband networks are changing the moving image production and distribution process. In response to these changes, preservationists need to not only re-think some of their daily practices, but also need to engage in some fundamental paradigm shifts in how they view the preservation process. 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. 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.

Annotation: This article examines the impact of digital technology in the creation and distribution of moving image material, and the corresponding impact this technological shift will have on the preservation of moving image material. While preservation literature often debates the viability of digitization as a preservation method, Besser points out that, increasingly, moving image material is being captured, edited and distributed in digital format. This movement away from using physical film altogether makes the imperative of formulating long-term strategies for preserving digital data against technological obsolescence an imperative, not an option. Furthermore, the fragility if analog film suggests that preservation should shift its focus to establishing guidelines for the preservation of digital information, rather than persisting in using analog re-formatting (or the copying of decaying analog material onto analog material in the creation of a fresh surrogate) as a temporary means of staving off the inevitable decay of analog film.

Besser envisions, furthermore, that the production of new films in digital format is leading to a paradigm shift in film preservation. The new generation of “born digital” films have created new categories of material for preservation—additional content such as out-takes, scripts, interviews etc. that add context and depth to the finished work. This material suggests film preservationists must shift how they envision their role. This
A paradigm shift will involve a movement away from saving finished works as physical artifacts, to an approach to film preservation that preserves works in their component parts—shots, ancillary materials, etc.—and focus on saving a digital works that have no “physical embodiment.”

In Besser’s view, film preservation is not at a turning point; it is at a precipice. “Born digital” films are quickly becoming standard practice in the film-production industry, and this digital revolution mandates that preservationists look forward rather than backward, and embrace rather than resist moving image digitization as a preservation method for material currently in analog format. As such, the difficulties and uncertainties of preserving digital data should not be seen as a deterrent to using digitization as a preservation method. Rather, putting together strategies to ward off technological obsolescence should be seen as an imperative, and prioritized.

**Search Strategy:** While browsing through the bibliography in Gracy and Cloonan (2003), I came across a citation for Besser, and decided to do an author search in Web of Science. The full text of the article was not available via Web of Science or SFX, and was instead copied from a hard-copy of the publication.

**Database:** N/A, photocopied from hard-copy of publication.

**Method of Searching:** Footnote chasing in Gracy and Cloonan, browsing *The Moving Image*.

**Search String:** N/A

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**Abstract:** This article attempts to offer an overview of the current changes that are being experienced in the management of audio-visual documentation and those that can be forecast in the future as a result of the migration from analogue to digital information. For this purpose the documentary chain will be used as a basis to analyse individually the tasks that are more significantly affected by this documentary and technological revolution. Although this article will focus on the management of television audio-visual information and the changes in ordinary documentation activities, the results may also be applied to other institutions working with the moving image. Automatic classification, automatic indexing, voice and video recognition and automatic generation of thesauri are some of the elements considered as potential and/or feasible methods to deal with and understand the information management activity of television channels.

**Annotation:** This article examines the potential of using automatic indexing technologies to comprehensively index audio-visual material. Cataloging audio-visual material at present
is an exhaustive process that requires the cataloger to analyze information being simultaneously conveyed, both in images and words, as well as the connotations and abstract concepts conveyed. Putting together a chronological analysis of audio-visual material requires an enormous amount of time and effort. With the emergence and domination of digitized audio-visual material, however, the possibility of employing software to analyze the content of the visual and audio material that makes up audio-visual material is possible. Specifically, the innovation of automatic speech recognition and biometrics software could potentially put together comprehensive analysis of audio-visual material. Employing such technology would make nearly instantaneous indexing and cataloging of audio-visual material possible.

Search Strategy: Found while doing background research on the topic in Web of Science, using advanced keyword search.

Database: Web of Science; full-text obtained using SFX.

Method of Searching: Advanced keyword search

Search String: ts=conservation and preservation and archives and film or moving image

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Abstract:
The literature representing 1999 to 2001 reveals that the preservation field is absorbed in an evolution. The literature demonstrates that trusted practices are changing to improve outcomes and further advance the preservation field. Simultaneously, in the wake of the digital revolution, preservation professionals dream about merging traditional and digital technologies in the hope that both long-term preservation and enhanced access will be achieved. This article attempts to relate the values of the discipline in order to inspire further research and persuade more work in formulating hypotheses to integrate preservation theory and practice. Finally, this overview of the literature will communicate the scope of the preservation problem, clarify misconceptions in the field, and document areas that warrant further investigation and refinement.

Annotation:
This literature review examines the impact of digitization on preservation, paying special attention to the role digitization currently and ostensibly will play in preservation practices. The digitization of information and the accessibility of this digitized information on the internet has created unprecedented levels of access, and corresponding changes in user expectations. This development has presented preservation professionals with a dilemma: while preservation formats such as microfilm have the longest shelf life, “the public does not embrace this technology as a satisfying tool for access” (47). Preservation professionals, therefore, must weigh the longevity of traditional preservation practices with the accessibility limitations inherent in their format. Digitization is
presented, in this context, as a tool for making information currently locked away from the public in archives accessible; it is not, however, considered a durable means of preservation because of the uncertainties surrounding its longevity, the absence of established preservation practices for digital information, and the unknown costs associated with this preservation.

Croft advances, in conclusion, that digitization coupled with more traditional preservation practices can serve as a means of eliminating the logistical impediments in accessing information, while also assuring its long-term preservation while the preservation community confronts the issue of digital information preservation, and the viability of digitization as a method of preservation—a task that Croft recognizes will become an urgent issue as the “emergence of new formats that require specialized preservation attention” such as “visual ephemera” and film collections demand an aggressive and innovative re-examination of current and potential preservation methods (65).

In short, this article examines the morphology of preservation practices in the digital era, carefully scrutinizes changes in preservation practice, and examines how these changes will impact the development of non-traditional preservation, such as film preservation.

Search Strategy: This article was found in the course of browsing through articles by Cloonan in Web of Science; Cloonan cites this article in her article, “W(h)ither preservation?”

Database: Web of Science; full text of article obtained using Academic OneFile.


Abstract: Within the confines of special collections in libraries, an established practice of preservation for film and video collections is largely non-existent. By comparison, the scale of resources needed to achieve meaningful programmatic efforts to preserve them is far greater than the resources libraries have assembled for traditional paper-based preservation. Management of moving image collections requires specialized knowledge and expertise. Consequently, while a mature system of preservation technology and methodology exists in libraries today to achieve the systematic preservation of books and paper-based materials, preservation programs generally have excluded the same provisions to sustain the usable life of moving image materials. With this in mind, this article seeks to articulate the current landscape of film and video preservation in libraries and examine the barriers that have hindered the development of full-fledged preservation programs for them. It is unclear whether traditional library preservation constructs can effectively inform the development of techniques and methodologies appropriate to film and video preservation. Nevertheless, it is perhaps more important, at this point in time, to stimulate and encourage fruitful discussion that will lead to such development.

Annotation:
This article discusses the state of film preservation as a discipline in the United States, and focuses, in particular, on the ill preparedness of cultural institutions, moving image archives, and libraries to effectively enact film preservation initiatives. This underdevelopment has occurred despite the fact that fragility of film and the imperative for its preservation has been widely recognized since the 1950s. This failure to act is due, in large part, to the lack of qualified personnel specializing in various methods of film preservation, the complexity and technical intricacies of film preservation itself, and the enormous cost of maintaining film preservation programs.

The end result is that film preservation lacks the guidelines and standard practices that have made book preservation successful. DeStefano suggests that in order for film preservation to become an attainable goal for cultural repositories and libraries that several developments must occur, the first and foremost being the education of film preservationists, or what DeStefano calls a “solid administrative infrastructure” (124). The development of standard practices and procedures based on “scientifically sound standards” (124) must also be developed in order for film preservation to keep pace with the disintegration of film.

This article does a wonderful job illuminating the complexity of film preservation, as well as many of methods used in film preservation, including duplication and storage. However, one shortcoming of the article is that while it recognizes that the various formats of film and the technological apparatus needed to view them is a serious impediment preservation and effective cataloging, it fails to question how reformatting of film into a more modern format—such as a digital one—could minimize this complication and make film more accessible.

**Search Strategy:** Found in the course of doing research in the INFOSCI file in Dialog.

**Database:** INFOSCI [Dialog]

**Method of Searching:** Keyword Searching

**Search String:** ss (preservation and (digitiz? or digitis?)) and (film or “moving image”)

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Accessed Via Academic OneFile.

**Abstract:** In this article, I address three sets of issues. First, is digital conversion a preservation technique or is selection for digitization fundamentally an issue of access? Second, how does the process of selection for digitization differ from selection for traditional preservation activities? What selection criteria apply? Finally, what effect might digitization have on preservation as a field?
In this paper, I consider three issues: whether conversion to digital form is a preservation action, the contrasts between selection for digital conversion and selection for traditional preservation, and the potential effects on the field of preservation. All of these issues are under active debate by, among others, Atkinson (1998), Conway (1996) and Hazen et. al. (1999). While consensus if growing, many points remain unsettled.

Annotation:
This article examines the role that digitization can play in preservation efforts, as well as the potential of using digitization as a preservation method in its own right. Preservation, ideally, entails the preservation of an item itself, and it cases where this is not possible, the creation of a durable copy of the item that captures, at the least, its intellectual content (para. 3). To date, the most durable medium for such a surrogate is microfilm, whose longevity is estimate at hundred of years (para. 4).
Gertz recognizes, however, that “preservation without access is futile” (para. 5).
Digitization provides one means of overcoming the limited accessibility inherent in physical surrogates of information in formats such as microfilm. Gertz advances that a hybrid approach to preservation that supplements traditional preservation practices with digitization is preferable, even necessary (para. 5).

Gertz, however, remains skeptical of digitization as a means of preservation, citing the uncertainty of digital data’s longevity and the expense of preserving digital data as two serious deterrent for preservation methods going all-digital. Gertz also cautions against digital exuberance, and asserts that institutions need to give serious thought to how they apply their digitization efforts (para. 24-26). Specifically, in selecting items for digitization, institutions must weigh the value, cultural significance, and rarity of the information they digitize. While the selection criteria for traditional preservation is based on the fragility of an object, selection for digitization must consider whether broader access to an item is worth the cost of its digitization, and any copyright costs associated therein (para. 21).

Gertz’s opinion that digitization offers a means of expanding access, but does not and cannot constitute a means of preservation holds quite a bit of currency in preservation literature; for example, similar opinions are expressed in Croft (2003). However, Gertz also recognizes the momentum with which digitized information has changed how information is accessed (para 5); she fails, however, to consider or ponder the coherency of her conclusions with the continued momentum of technological advancement.

Search Strategy: Found using a title search in Web of Science for “preservation” and “digital.”

Database: Web of Science; full-text article obtained using Academic OneFile.

Method of Searching: Keyword search in Title field.

Search String: Title=(preservation AND digital).

Abstract: N/A

Annotation:
This article is a comprehensive review of the history of film preservation, the historical and contemporary issues affecting the field of film preservation, and shifts within preservation practices in the wake of rapidly-spreading technological advancements. Gracy and Cloonan pay special attention to the impact of digitized video on film preservation. The movement in film production, in particular, away from the medium of film to digital video is presented as being especially problematic, as this development was not accompanied by sufficient consideration for the difficulties of preserving digital data, the threat of technological obsolescence being the foremost and most dangerous. The issue of technological obsolescence among older, analog copies of film is also recognized, as is the reality that reformatting—into either analog or digital formats—is the most practical means of sustaining usable and viewable copies of film in any collection.

The article takes a somewhat neutral stance on the issue of digitization as a method of preservation (at least in comparison to some of the other literature on this subject). Reformatting film is and has always been a preservation method, and a means of maintaining a working copy of film whose original copy is either rapidly deteriorating, or is in an obsolete format. While Gracy and Cloonan recognize that the next logical step in reformatting is into a digital format—whether that be in the form of a DVD, or a digital file—they do not take an ideological stance on digitization as a means of preservation, and opt, instead, to explore the issues of metadata creation and management, and issues of technological obsolescence that are intrinsically tied to digital data.

Search Strategy: This article was found using an author search in the advanced search options on Google Scholar. The full-text of the article was obtained in hard copy.

Database: Google Scholar

Method of Searching: Author Search

Search String: “Karen F. Gracy” or “Gracy KF”

Abstract: This article examines the changing landscape of moving image archiving in the wake of recent developments in online video sharing services such as YouTube and Google Video. The most crucial change to moving image archives may not be in regard to collections themselves, but rather the social order that sustains cultural institutions in their role as the creators and sustainers of objectified cultural capital. In the future, moving image stewardship may no longer be the exclusive province of institutions such as archives and libraries, and may soon be accomplished in part through the work of other interested individuals and organizations as they contribute to and define collections. The technologies being built and tested in the current Internet environment offer a new model for the reimagined moving image archive, which foreground the user in the process of creating the archive and strongly encourages the appropriation of moving images for new works. This new archetype, which in theory functions on democratic principles, considers moving images—along with most other types of cultural heritage material—to be building blocks of creative acts or public speech acts. One might argue that the latter represents a new model for creating an archive; this new democratic archive documents and facilitates social discourse.

Annotation: The innovation of digital media has brought about a transformation in how moving images are stored, accessed and shared, and will also have impact on how digital media is preserved. Foremost among this revolution are services such as YouTube and Google Video that allow users to contribute, edit and annotate the content of enormous digital media archives. Such services have demonstrated two things: that the digital format is conducive to allowing wide-spread access to moving images, and also, in a less concrete manner, that individuals can be made proactive stakeholders in repositories of cultural information. This latter development directly challenges the traditional role of the moving image archive (and other cultural institutions) as organizations whose purpose is to determine the value of cultural objects, and select objects for preservation based on this assessment. This is not to say that such cultural institutions have become obsolete, or an anachronism; to the contrary, they play an invaluable role in preserving older analog material, and will continue to be essential to maintain the growing mass of digitized moving images produced by movie studios, broadcast companies, etc. Furthermore, the challenge that YouTube presents to the cultural institution is not a destructive one, but rather a constructive one; cultural institutions, in other words, face the challenge of integrating the best practices and technologies such services have produced in the past years to expand and re-image their form, purpose, and collection. Gracy specifically imagines that in the future, cultural institutions will create systems that integrate user-created content and commentary in a collaborative manner that would “enrich” the institution’s collection (Gracy 2007 195).

While this article is very esoteric and abstract, it is, at the same time, very positive and progressive, and quite honestly refreshing. So much of the material on this subject focuses on why something is not possible: why digitization is problematic, how copyrights prevent open access to moving image archives, why cataloging moving images is a nearly impossible task. All of these issues focus on problems resulting from the systems and institutions in place now; Gracy, on the other hand, looks past these
ephemeral pitfalls and instead imagines an entirely “new order” of how things could be. While this fails to solve the problems at hand, it does suggest a longer term solution to work towards, and clearly outlines the benefits of doing so.

**Search Strategy:** Keyword search.

**Database:** INFOSCI [Dialog]

**Method of Searching:** Keyword searching

**Search String:** ss (preservation and (digitiz? or digitis?)) and (film or “moving image”)


**Abstract:** Addressing the preservation and long-term access issues for digital resources is one of the key challenges facing informational organisations such as libraries, archives, cultural institutions and government agencies today. A number of major initiatives and projects have been established to investigate or develop strategies for preserving the burgeoning amounts of digital content being produced. To date, the alternative preservation approaches have been based on emulation, migration and metadata—or some combination of these. Most of the work has focussed on digital objects of a singular media type, HTML, images, video or audio and to date few usage tools have been developed to support or implement such strategies or policies. In this paper we will consider the preservation of composite, mixed-media, objects, a rapidly growing class of resources. Using three example of new media artwork as case studies, we describe the optimum preservation strategies that we have determined for each exemplar and the software tools that we have developed to support and implement these strategies.

**Annotation:**
This article discusses different methods of preserving digital content, specifically as it concerns digital content that is multimedia in nature, with a distinct focus on multi-media works of art which combine graphics, film, sound, etc. Such pieces of artwork are now commonplace in most museums, and are esteemed as culturally significant works of great value. Preserving such pieces of artwork entails the same complexity of preserving digital video in general; that is, they are dependant on the technology with which they are produced, and therefore their preservation requires either the preservation of the technology needed for their viewing, or a migration of the artwork’s content itself into newer formats as technology advances. Hunter and Choudhury assert that migration is the most viable form of preservation, given that it is accompanied by substantial metadata that both describes the work’s contents, and also metadata provided by the artists concerning intention, inspiration, intended presentation, etc.

This article is relevant to the study of digitization as a preservation method for moving image works (whether they be newsreels or instillation pieces) as it outlines new and
innovative approaches for preserving digital content and avoiding technological obsolescence that has proven a major impediment to the preservation of digital content. The article also offers insight into the potential uses of metadata for the preservation of digital content that would be broadly applicable to the preservation of moving image digital content.

Search Strategy: This article came up in a keyword search in Google Scholar.

Database: Google Scholar

Method of Searching: Keyword searching

Search String: film moving image preservation digitization digitisation


Abstract:
Purpose—To provide a selective bibliography of literature which explores issues and provides guidelines for library digitization projects.
Design/methodology/approach—Literature published from 2000-2005 on library digitization projects was examined. Issues involving digitization projects are presented, as well as case studies and resources for digitization projects. The paper has the following sections: project management, funding digital projects, selection of materials, legal issues, metadata creation, interoperability, and preservation issues.
Findings—Libraries are undertaking digitization projects to provide wider access to and to preserve materials. The literature survey presents an overview of digitization activities and discussions of issues concerning library digital projects. The authors of the case studies detail how libraries dealt with various components of the projects, such as planning, cataloging, and handling copyright issues. Many aspects of digitization projects will be changing over time, with further research and advances in technology, and the literature on the subject bears watching in coming years.
Practical implications—The articles and resource guides in the literature survey can assist librarians in carrying out digitization projects in their institutions.
Originality/value—It explains how important issues in library digitization project are being encountered and resolved and provides many practical guidelines and resources for librarians undertaking such projects.
Keywords—Digital libraries, Research libraries, Collections management
Paper Type—Literature review

Annotation:
In this literature review, Lopatin addresses the benefits and challenges of digitization projects. While digitization projects have the potential to provide an unprecedented level of access to special collections and library holdings, the orchestration of digitization projects is complex, and requires institutions to dedicate long-term funding for the
maintenance of digital data. Lopatin addresses the logistical issues of project management, funding, the selection of materials for digitization, copyright issues and changing definitions of “Fair Use,” the creation of metadata, and long-term preservation of digital content. On this last point, Lopatin observes that while many libraries have enthusiastically started digitization projects, too few consider the task of long-term preservation of digital content, which is essential to the content’s longevity, and suggests that this will become an issue of great concern in the coming years. Lopatin also addresses the debate surrounding digitization as a means of preservation; specifically, whether or not digitization can be considered a reliable and durable form of preservation.

This review brings up many salient points, especially those concerned with the legitimacy of digitization as a preservation method; this is a recurring theme in literature concerning the preservation of film. The review also does a wonderful job of elucidating the complex processes that go into a digitization program, as well as technological advances—especially those related to metadata creation and storage—and the potential impact these advancements may have in the future.

Search Strategy:

Database: ISI Web of Science

Search String:


Abstract: Many school, college, university, and public libraries have collections of educational, industrial, scientific, and documentary films which are still being used in teaching and research. The majority of these films are in the 16mm format. Unfortunately, improper or inadequate storage, handling, and maintenance may result in the premature aging and deterioration of the films. Yet, these film resources often include unique and valuable moving images that are not available on video formats such as videotape, laserdisc, or Digital Video Disk (DVD). Taking a few simple and relatively inexpensive steps can improve the care of 16 mm films and enhance chances for the survival of the moving image collections that exist in libraries. This can often be accomplished with modest investments in resources and time on the part of libraries and library staff.

Annotation: This article addresses the physical decay of film in analog format, and presents research on methods for its preservation without the use of reformatting; these methods focus on correct storage and handling. Reformatting—or copying decaying film, oftentimes onto a newer format—is not addressed. This article’s focus, rather, is on preventative measures that can be taken to extend the longevity of film.
This article is included to present a background on the issues that necessitate film preservation that extends beyond proper storage.

**Search Strategy:** This article is cited in Croft (2003).

**Database:** Full text of article obtained via Academic OneFile.

**Search String:** N/A


**Abstract:** Television production has shifted rapidly from an analog process to one where virtually all programs are created and finalized as digital files. Such productions in public television are at great risk of being lost, because practices for long-term preservation of digital video are just now emerging, and because there is no mandate for preservation within the public broadcasting system. NDIIP funded Preserving Digital Public Television, a partnership between WNET-TV in New York, WGBH-TV in Boston, PBS and New York University, to build a model preservation repository for digital video files and to examine the broader issues related to operating such a repository. In addition to designing the repository itself, the project became a lead advocate for adopting technical and metadata standards across the television field. The project also successfully challenged the public television system to recognize that preservation is necessary to keep digital production alive. This resulted in public broadcasting allocating money for the first time to launch an initiative with a goal of properly managing its collective archival holdings.

**Annotation:**
This article addresses the impact of digital broadcasting on the preservation efforts of public television stations. The Deficit Reduction Act of 2005 required that all U.S. television stations turn off their analog transmitters by 2009, and begin broadcasting on digital channels (394). Prior to this change in standards, many television stations had already begun recording broadcasts in digital format. This shift from analog to digital format came with added responsibility of developing new systems to archive digital footage, with all of the challenges inherent therein.

Rubin’s article focuses on the development of archives for digital material for public television stations. Public televisions have the legal and moral obligation to archive material of education and cultural significance (395); therefore, the development of new systems and standards to archive the digital footage produced by public televisions is all the more important. The task of preserving this digital material is complicated by the fact that there are, at this point, only loosely defined standards and best practices for the preservation of digital data (395).
Rubin focuses on the efforts of WGBH in Boston, WNET in New York and PBS to develop a model repository for digital television footage—an endeavor, which was funded by the Library of Congress (396). Rubin examines, in particular, efforts that were taken in the project to create standards for metadata, and efforts taken to insure that long-term preservation.

This article provides incredible insight into the reality that digital formats will, increasingly, become the normal or standard format for audio-visual material, and provides a basic blueprint for the steps that must be taken to ensure that this data is preserved and will remain accessible. In this sense, it is a rebuttal to arguments against that propose the threat of technological obsolescence makes digitization an unsuitable means of moving image preservation.

Search Strategy: Footnote chasing

Database: Web of Science, copy obtained from Project Muse

Search String: (CITED AUTHOR=BESSERT H*) AND (CITED YEAR=2001)

Note: I originally found this article in Dialog in the INFOSCI database using the keyword search string ss (preservation and (digitiz? or digitis?)) and (film or “moving image”). I originally ignored this article, until I found its connection the Besser article, which I found very relevant to my topic. It was at this point that I circled back to this article, and decided to include it in this bibliography.


Abstract: Digitisation is used for the preservation of audiovisual material. This preservation work is a major producer of digital collections—which then need digital preservation for sustainability. EC Project Presto surveyed the holdings and status of ten major broadcast archives—a significant portion of the total European broadcast archives, including some of the largest digital collections. The main findings are that approximately 75 percent of this material is at risk or inaccessible and that the collections are growing at roughly four times the rate of current progress in preservation work. This paper gives further results of the project, and gives practical guidance for preservation of audiovisual material. Presto demonstrated the effectiveness of the “preservation factory” concept for major broadcast archives—a way to reduce cost while maintaining or even increasing quality. There is now a new EC project, Presto-space, which will make the preservation factory available to small and medium-sized collections.

Annotation: This article examines the use of digitization as a means of preservation for audio-visual material, and cites the PRESTO project as a case study. The PRESTO project took place from 2000-2002 in Europe, and was led by the BBC, with the partnership of the Institut
National de l’Audiovisuel in France, and Radiotelevisione Italiana in Italy. The purpose of the project was to better understand the issues and problems of audiovisual preservation, and develop “solutions and joint standards” (72).

PRESTO findings concluded that there is at least 100 million hours of audiovisual material worldwide, up to 70% of which is in need of preservation (72). The PRESTO project examined the viability of digitization as a method of preservation, and concluded that this was the most preferable method of preservation.

Wright discusses in detail the problems inherent in preserving digital data (or the digitized copies of audio-visual material)—an issue consistently addressed in preservation literature, including: the cost of digitizing audio-visual material, and the pains that must be taken to prevent the technological obsolescence of digital data. Wright rejects, categorically, any of these issues as a reason not to embrace digitization as a means of preservation. He observes, specifically, that the cost of reformatting (or copying) analog copies of audio-visual materials as a means of preservation is not only costly, but also requires a human-touch; digitization of film is also costly, but as Wright observes, once the material is digital, it will be far cheaper to reformat in the future as technology changes, as this process can be accomplished by a computer (74). This observation is an adept one, and one that is rarely addressed in other preservation literature.

Wright also observes that digitization of audio-visual materials is an inevitably, not a possibility; therefore, an argument against digitization is a moot point. Preservation efforts, Wright asserts, need to be consistent with emerging trends; the digitization of information—and audio-visual material, in particular—is already occurring at increasingly larger scales.

This article takes a strong stance on the viability of digitization as a means of preserving audio-visual material; the strength of Wright’s arguments is that they are not ideological, but, but are, rather, pragmatic, and cite solid evidence in their assertions.

Search Strategy: This article came up in a keyword search in Dialog in the INFOSCI file.

Database: INFOSCI [Dialog]

Search String: ss (preservation and (digitis? Or digitiz?)) and (film or “moving image”)
Personal Conclusion

When I chose the topic for this project—digitization as a method of film preservation—I had a clear idea in my mind—without any research to back it up—that I would find a wealth of research on the uses of digitization to preserve film. What I found was the opposite—a roaring debate over whether digitization could be used a preservation method, period. This was wholly unexpected, and, furthermore, required me to put together a search strategy for this project blind. Suddenly, I had no idea what I was looking for, and was entirely in the dark.

Navigating through this darkness was, by far, the best learning experience I’ve had to date. It forced me to be innovative, and forced me to piece things together as I went. This involved finding a few key articles, and building my knowledge from there. I looked through these articles’ descriptors for clues about keywords. I scanned bibliographies, and used Web of Sciences to find related articles through citation patterns. I have to admit that I’m not entirely happy with my results, although I am happy that I was able to find a few articles that were entirely salient to my topic. Throughout my searching, I thought that I was on the bring of finding “the” article—the perfect match for my topic, and the Rosetta stone that would give me a lush bibliography and a cornerstone around which to build my project. I wasn’t able to find it. If you have any suggestions as to where I should have looked, I would be so happy if you could pass them on to me.