GIOVANNA FOSSATI

FROM GRAIN TO PIXEL

The Archival Life of Film in Transition

THIRD REVISED EDITION

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TO GLORIA AND MATILDA

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Introduction to the Third Revised Edition[i]

This book was originally published in 2009 as an attempt to lay the foundations for a new approach to film archival theory and practice. While addressing the questions "what is film?" and, by analogy, "what is film heritage?" in the technological and cultural shift to digital, I moved away from the unproductive opposition analog *versus* digital and proposed to look at film's nature from the perspective of transition. Considering that film as a medium had never existed in one distinctive form, I argued that its transitional character became even more evident because of the digital turn. Film archivists and curators have always made choices about what to preserve, what and how to restore, and what and how to exhibit, based on different interpretations and conceptualizations of film's nature and ways of approaching film archival practices. By analyzing the cultural, aesthetic, economic, and social factors behind these choices, we come to recognize different frameworks that have informed the archival practice (in a more or less conscious way). And by recognizing these frameworks, it is possible to start defining a theory of that practice.

Since its first publication, the book was reprinted with minor adjustments in 2011 and was made available online as an open-access resource.[ii] It has been regularly taught in the MA program *Preservation and Presentation of the Moving Image* at the University of Amsterdam and has been adopted by several academic courses focusing on film archiving and preservation around the world. In many ways, with this book I have accomplished one of the main goals I had set for myself ten years ago: to provide guidance to researchers, professionals, and students alike in the relatively young discipline of film heritage studies.

Despite being a few years further along in the transition from analog to digital, I still consider *From Grain to Pixel* a valuable and topical tool for a number of reasons. Firstly, it still offers an accurate description of the development of film archival practice over the last decades (particularly in Chapter One and in the case studies in Chapter Four). Furthermore, it captures a snapshot of a specific moment in the transition to digital, namely the decade that saw new digital tools slowly emerge as sporadic experiments at the beginning of the 1990s, and then become regularly adopted, from 2005 onward. The realization that the period 1997-2007 would become so crucial for the transition to digital could not yet be fully grasped when the first two editions came out in 2009 and 2011, as the so-called digital rollout (when the digital infrastructure for film distribution and projection took over the analog one) in the Western world followed right after, in 2011-2012.[iii] In the years that followed the digital rollout, analog production, post-production, distribution, and projection quickly became the exception. The roles had reversed with digital becoming the norm rather than the exception. Both studio and independent productions abandoned analog as a means of distributing films.[iv]

Secondly, the book's stance on the hybrid nature of archival practice is still valid today. After all, film archival and restoration workflows are still often a combination of analog and digital technologies; furthermore, even digital filmmaking and restoration practice cannot help but draw on 120 years of analog tradition. As will be illustrated in the updates to Chapter One, the film archival workflow is, and will remain, hybrid for a long time to come as the greater part of archival holdings yet contain analog films and even the new digital films entering the archive are in many cases hybrid products conceived within a hybrid film culture.

As I foresaw ten years ago, analog filmmaking has become a niche practice.[v] At the same time, a movement of filmmakers and artists has recently emerged that privileges the use of photographic film and advocates keeping its production alive. Filmmaker and artist Tacita Dean was one of the first to plead publicly for the survival of the manufacture and post-production of analog film. Other leading advocates such as Hollywood filmmakers Christopher Nolan and Quentin Tarantino have also pressured studios to make deals with Kodak guaranteeing a minimum amount of film-stock production that would allow directors to shoot on film should they prefer to do so.[vi]

Thirdly, the book still serves its purpose of bridging theory and practice while, hopefully, stimulating interest in film archival practice and theory among media scholars. Although new academic literature has since appeared – Everett (2008); Lipman (2009); Pescetelli (2010); Bursi and Venturini, eds. (2011); Frick (2011); Bordwell (2012); Enticknap (2013); Parth, Hanley and Ballhausen, eds. (2013); Catanese (2014); and Lameris (2017) among others – relatively little has been written about film heritage (practice and theory). Luckily, the communication gap between scholars and archivists so prominent a decade ago is slowly being bridged. In our increasingly digital film culture, a productive dialogue between academia and archivists is certainly becoming more and more relevant.

An additional reason why I believe this book is still relevant today is that its theorization is still applicable to changing practices, in part because these have not radically changed, and in part (and more importantly) because it is a theorization that transcends specific technological shifts. Being a theory of practice in transition and having defined transition as a perpetually ongoing process in film history and practice, its relevancy, it seems, will not be affected by an increase in the level of digitization in practice.

That said, I do believe that this book has some limitations. Firstly, with a limited focus on sound, the importance and scale of film sound archiving and restoration could not be properly addressed (a short update to Chapter One attempts to partially rectify the omission); and secondly, lacking a broader approach to film heritage, the discussion of ephemeral collections (such as home movies, industrial films, advertisements, etc.) and special collections (such as apparatus, stills, posters, company archives, etc.) has unfortunately been overlooked. This limitation in scope is further discussed in the new Conclusions. Finally, perhaps the book's most glaring limitation is its exclusively Western perspective. In this regard, I am aware that the term "film heritage" should be interpreted critically as it is mainly the product of Western film archival tradition (namely European and North-American).[vii] Remaining critically attuned to such shortcomings, film scholar and archivist Caroline Frick aptly expressed that:

> Greater critique of the cultural heritage rationale, and its accompanying support of a specific mode of historical preservation, should be a component of such discussions as it encourages and even argues for more substantive questioning of standard conservation practice. (2011: 155)

As we move toward a more varied landscape of archival practice in which a plurality of approaches and perspectives coexist, I hope that the growing number of non-Western students graduating from film-archiving programs will soon join the discussion. As for my part, it is one of my future objectives to expand my research to non-Western discourses, practices, and traditions.

For this revised edition of *From Grain to Pixel*, I felt that it was more effective to update rather than rewrite the book as the previous editions still hold up.

In this Introduction, I will address the current trends that I consider particularly important for film heritage studies today and how this field is becoming increasingly more relevant and established within the academic landscape. In the closing paragraph, I will offer a reading guide to this updated volume.

To start with, let me pose a general question: now that digital has become dominant can we still speak of film? Film scholar and founder of the Orphan Film Symposium Dan Streible has argued that talking about "digital film" today is an oxymoron (2013). Indeed, a "film" is a strip of celluloid coated with a layer of emulsion on which a succession of photographic images has been imprinted. As such, film by definition does not come in a "digital" format. Contrarily, I would argue that using the term "film" to also refer to "digital films" is not only legitimate, but necessary. In order to claim the continuity of 120 years of film history, it is vital that such an analogy will not be dismissed out of hand. It also serves the purpose of stressing the materiality that digital films still share with their analog predecessors, a characteristic of digital film that is too often overlooked. What is so appealingly unique about the word “film” is that it refers to the medium’s materiality, which is one of the levels at which the science of film continues to operate in today’s “digital film culture,” a material level that most people never directly access and thus fail to recognize.

Apart from referring to moving images, the term “film” also refers to a cultural, social, aesthetic, and, I cannot stress this enough, “material” sphere that finds its roots in the experimentation of the late 1800s. It all started with a flexible film of celluloid coated with a layer of silver emulsion. At that time, most people could not access such material layers, much in the same way they do not have direct access today to the binary codes on digital film CARRIERS. However, everybody understands that film necessitates there being “material things” that, in one way or another, support what is seen on the screen. Such awareness has been at the center of the development of film heritage as a science. As Streible points out:

> [It is not] necessarily incorrect to refer to digital or electronic moving images as films. Rather, if we forget to specify what photochemical film was, we stand to lose important historical knowledge and awareness. Important distinctions become lost if we neglect what preservationists, archivists, and technical experts have brought to recent film historiography. (2013: 229)

“Film,” as I would like it to be intended, is a broader concept that transcends the technological differences such as that between the analog and the digital. Film heritage includes all the elements that inform and form film culture. And while today’s film culture has happened to become increasingly “digital,” it is based on more than a century of analog film and analog film culture.

Interestingly, the establishment of the first film-heritage study programs coincided with the discourse on the demise of cinema, which started in the 1980s, under the threat of multiplexes, and resurged with the rise of the home-movie industry and the advent of large-scale digitization. As Marijke de Valck recently pointed out:

> [I]t might very well have been the sense of crisis surrounding cinema and the demise of an intellectual culture of film that fed into simultaneous visions to create programs that would deliver the new generation of archivists, curators and programmers that could save the cinema that was so clearly perceived to be under threat. (De Valck, 2015: 3)

Film heritage comprises the theory and practice of collecting, archiving, preserving, and presenting films. The 1930s saw the first film archives established in the Western world: among them, the film department of the New York Museum of Modern Art, the British Film Institute, the Cinémathèque Française in Paris, and the Reichsfilmarchiv in Germany (Houston, 1994). After World War II, an increasing number of film archives emerged across the world.

While collecting, preserving, and showing national film heritage have been some of their main goals, public non-profit archives also often have a strong focus on international avant-garde films. This can be linked to the solid relationship that was cultivated during the 1920s and 1930s between avant-garde filmmakers and early-film theorists who were establishing film as a form of art. Because film archives subscribed to that idea, it strengthened their very *raison d'être*. Note that until then, films were mainly seen as a form of entertainment and were usually destroyed after commercial release to retrieve the silver in the emulsion.[viii]

With the film archive movement, films began to be considered part of our cultural heritage. In 1938, the International Federation of Film Archives (FIAF) was founded and a number of principles were defined which are still binding today for film archives worldwide. Film archival practice has developed since then; but during the first four decades it remained quite inaccessible and, at times, even secretive, partly due to complex legal issues. Indeed, the copyrights of many films held by archives were in fact owned by commercial companies that could (and at times did) claim their rights on the films. The inaccessibility of film archives was also partly due to a limited interest in archival films by a larger audience and the academic community.

This situation came to an end in the late 1970s. At the 34th Annual Congress of the Federation of Film Archives held in Brighton in 1978, a group of film scholars were invited to view and discuss several hundred early films, approximately dating from the period 1900-1906. This event has been recognized by many as the starting point of a new relationship between the practice of film archiving and academic film studies. Since then, the Brighton Congress has gained an almost mythical status in the field and has inspired a new stream of studies by scholars concerned with film heritage, such as Tom Gunning and André Gaudreault (both of whom participated in the Brighton Congress), Thomas Elsaesser, Jane Gaines, William Uricchio, Frank Kessler, and many more in recent years.

As pointed out by Elsaesser in his "The New Film History" (1986), the 1980s saw the emergence of a wave of historians who initiated a new way of approaching film history. The Brighton Congress has undoubtedly been a turning point in helping film archives open their vaults to film researchers, leading to unprecedented collaborations between scholars and archivists. In Uricchio's words, Brighton "gave novel stimulus to the distribution of archival films, but first of all to its restoration" (2003: 29-30).

In 1984, the first academic master program in film archiving was launched at the University of East Anglia in collaboration with the East Anglian Film Archive in Norwich, England. With this program, the academic history of film heritage officially started. Since then, a number of similar programs have followed suit, including the MA program *Preservation and Presentation of the Moving Image* at the University of Amsterdam, launched in 2003 in collaboration with Eye Filmmuseum, the Netherlands Institute for Sound and Vision, and the Living Media Art Foundation (LIMA). Other programs established around the same time include the Moving Image Archive Studies program at the University of California in Los Angeles; the Moving Image Archiving and Presentation program at the New York University; and the master degree at the University of Rochester, New York, in collaboration with the L. Jeffrey Selznick School of Film Preservation at the George Eastman Museum. More recently, similar academic programs have been introduced worldwide, including those at the universities of Udine, Berlin, and Frankfurt. The proliferation of these academic programs and the establishment of the Chair in Film Heritage and Digital Film Culture at the University of Amsterdam are signs of renewed interest in the field. A recent academic publication that reflects on the institutionalization of moving-image archiving programs approximately two decades after their introduction (Olesen and Keidl, eds., 2018) is yet another testament to their growing popularity.

Due to its relatively young age as an academic discipline, film heritage studies form an unevenly charted territory that has historically grown out of film and media studies. Yet, from its inception, it has always been in dialogue with other disciplines such as heritage and museum studies, art history, digital humanities, and, more recently, computer science. One thing that has become evident in the first two decades since its introduction is the importance of keeping theory and practice in balance through a fertile collaboration and interplay between the leading scholars and archivists in the various fields of education, research, and practice.

Along similar lines, the combination of theory and practice lies at the heart of my own work both as a scholar and museum curator. I have always felt very strongly that bridging theory and practice is essential and especially urgent today because the technology, expertise, and conceptualization of film are changing so rapidly. For the same reason, the *archival life of film* (that is, what happens to the film artifact once it enters the archive) needs to be reopened for discussion, while paying particular attention to new developments in film discourse and new trends within filmmaking and film culture.

A case in point is the development which is taking place in the larger landscape of film and which is affecting the current film-heritage discourse: the so-called “material turn.” Representing a renewed longing for the experience of the film medium’s materiality, the “material turn” can be found in work by filmmakers and artists alike, including Peter Delpeut, Gustav Deutsch, Bill Morrison, Tacita

Dean, and, more recently, Hollywood filmmakers such as Christopher Nolan, Paul Thomas Anderson, and Quentin Tarantino.

The "material turn" in film could be interpreted as a reaction to the "digital turn," emphasizing the haptic interaction with the material as opposed to the experience of the perceived immateriality of digital access. With regard to film specifically, the renewed interest for analog film could be seen as a counter effect of the digital rollout. Indeed, until recently the focus on film materiality, while present, was quite rare.[ix] Since the digital rollout (approx. 2011-2012), the topic of film materiality has become much more pervasive. I have already mentioned the plea by Tacita Dean for maintaining film-stock production and post-production facilities as a viable option for filmmakers and artists who prefer (the aesthetic characteristics of) analog over digital, and the similar appeal by Hollywood filmmakers of whom Christopher Nolan is probably the most outspoken. Moreover, scholars such as Barbara Flueckiger (2012) and her team at the University of Zurich have made film materiality a central topic of their research (their work in the FilmColors project will be discussed in more detail in Chapter One). Even a cultural theorist such as Giuliana Bruno focuses specifically on materiality in her book *Surface: Matters of Aesthetics, Materiality, and Media* (2014), in which she addresses the question of the place of materiality in this time of rapidly changing materials and media by looking at recent work by media artists, filmmakers, and architects.[x] In line with these developments in filmmaking and academic research, the film archival field is also exploring the topic with a number of film archiving programs focusing on the study of the material aspects of the film medium (Campanini et al., 2017). Despite, or perhaps more accurately because of, the digitization of most movie theaters, there has been a revival of interest in the medium of film by cinema audiences. Today's filmgoer seems particularly keen on watching rare projections of film reels in *cinémathèques*, especially 70mm screenings of restored and new titles, as discussed in Chapter One in relation to the 70mm release of *The Hateful Eight* (Quentin Tarantino, USA, 2015). Furthermore, the proliferation of art houses dedicated to the screening of celluloid prints clearly demonstrates the rising popularity of analog film.[xi] In fact, experiencing a traditional film projection has become an "event" not to be missed, not unlike what scholar Erika Balsom discussed in relation to the hype around the installation of *The Clock* (Christian Marclay, 2010) or the launch of a new iPhone (2013). Hype or not, the interest for analog film screenings is ubiquitous and with film archival festivals such as the George Eastman Museum's Nitrate Picture Show screening vintage nitrate film prints, now returning for its fourth year, it seems it will remain so for some time yet.[xii]

While the "material turn" is intrinsically related to the "digital turn," it is not, in my view, in opposition to it. Instead, it would be more accurate to refer to it as its companion. In fact, I would argue that there is no such thing as immaterial digital film. A digital film is as material as any other object; it is stored on a material

CARRIER, projected through a material digital projector, and screened on a material screen or viewed through a device (computer, tablet, or smartphone). And, like its predecessor, it is immersed in a material cultural environment consisting of its makers, users, and caretakers. In this line of reasoning, digital films are the result of a century-long tradition of analog films and, as such, they bear the same material and cultural traces.[xiii]

In this revised volume, the text of the first 2009 edition (including minor adjustments made in 2011 for the second edition) has been left fundamentally intact, with the exception of a few corrections, updates of institutional names, and minor revisions in the body of the text and in the footnotes. The stylistic layout of the updated texts (approx. 100 pages) notably differs from the original text; along with a new general Introduction and Conclusion, updates are included per chapter.

In Chapter One, after a brief introduction of the most important changes in the practice, each theme/section of the original text is followed by an update that gives an overview of the changes in the last ten years and the current state of affairs (2017-2018). The discussion on the changes in film production and post-production practices (in 1.1) aims to highlight some of the ramifications for today's archival practice (in 1.2).

In Chapter Two, in addition to a new introduction, the update on this chapter about the theorization of archival practice includes a new theoretical framework. The "film as performance" framework is described here as a means to capture the performative dimension of film. It will be argued that this framework is particularly relevant for the restoration and presentation of early cinema and experimental films, and that it could shift the discussion around film archival practice further away from film as an artifact.

In Chapter Three, the new introduction is followed by brief updates to the sections describing the four archives and three laboratories discussed in the 2009 edition. Updated interviews have been conducted with the same people that were interviewed ten years ago or with the persons who have replaced them since.

In Chapter Four, a new introduction on the relevancy of past and present case studies is followed by a newly added case study, focusing on the restoration of *We Can't Go Home Again* (Nicholas Ray, USA, 1973). Discussed in relation to the new "film as performance" framework, introduced in the update to Chapter Two, and the well-established remediation concept, this case study provides a detailed examination (illustrated by newly added color images) of some of the intricacies of such a restoration project.

In the new Conclusion, I will mainly address new directions for research in the field and touch upon a number of relevant recent projects.

Finally, the glossary of technical terms, the bibliography, the filmography, and index of names have been updated to include the newly added entries.

Framing Film (in Transition): an Introduction

Film is in a state of rapid change, a transition where analog (photochemical) film is being gradually replaced by digital film. Most think that digital projection will substitute traditional film projection already within a few years. This transition, evident across media in both the commercial and the cultural fields, profoundly affects not only the practice of filmmaking and distribution, but also the practice of film archiving, and the theoretical conceptualization of the medium.

Past instances of technological transitions within film have succeeded one another throughout the nineteenth and the twentieth century, from a variety of pre-cinema technologies and practices to a number of moving image technologies; early moving image technologies were sometimes accompanied by experimental sound systems, experiments that continued throughout the first part of the twentieth century until a standard was established in the early 1930s; and in the 1950s, the moving image was again transformed with the introduction of television, within a technological frenzy that involved both the newly born television medium and the film medium, for the first time put under pressure by competition. All these moments of transition have worked as a catalyst for a process that has never found rest: the continuous transformation of audiovisual media or, maybe even more aptly, as this work intends to demonstrate, their inherently transitional nature.[1]

Grown inured to the profound changes film has undergone in the past, many argue that with the digital turn a transformation of a different kind is occurring, and that with the digital, along with a technological transition, also an ontological change is taking place. To address this line of thought it is necessary to consider and discuss the very nature of film.

The current technological transition from analog to digital cuts across all modern media from print to sound, from photography to video and film.

Film, the central focus of this study, is witnessing a time of unprecedented change. Existing logics of production, distribution, and exhibition are challenged, and many different and competing standards are being introduced. The turmoil around this ongoing change has spread from the film industry to its audiences, from academia to cultural institutions.

Early appearances of digital technology in film can be traced back to the late 1970s with the first attempts to create digital special effects and, later, in the 1980s, when the anticipation of an imminent digital turn in film production grew more pronounced. At that time Francis Ford Coppola envisioned the arrival of DIGITAL CINEMA, and, even more insistently, George Lucas began his long-standing militancy for the all-digital film. Nevertheless, thirty years later we are still witnessing a progressive hybridization of technologies where analog and digital coexist in many segments of the production chain. Indeed, both old and new technologies keep changing in ways that are not converging. While editing, for instance, has indisputably become an all digital affair, projection is still almost all analog and, similarly, films shot using exclusively digital cameras are still a minority. However, although analog and digital technologies at this point complement each other in a hybrid form, digital technology is still expected to take over film and other media altogether. As I write, the digital has shown only the tip of its potential: Moore's law remains valid and we continue to see dramatic increases in processing power, storage capacity and transmission speed.[2] We are clearly at a transitional moment and, as William Uricchio put it, we "have a sense of what is looming in the distance, but its magnitude is not yet visible or even imaginable" (2007: 19). Indeed, in the middle of the technological transition, with a sense of the direction (towards the digital) but with no real sense of the destination, we have a unique (and uniquely limited) point of view. To use Tom Gunning's words, the still unexplored potential of the digital holds an uncanny fascination for us who are witnessing its emergence:

> Every new technology has a utopian dimension that imagines a future radically transformed by the implications of the device or practice. The sinking of technology into a reified second nature indicates the relative failure of this transformation, its fitting back into the established grooves of power and exploitation. Herein lays the importance of the cultural archaeology of technology, the grasping again of the newness of old technologies. (2003a: 56)

The current technological transition comes with promises of a revolutionized medium and the utopian dimension has not yet surrendered to the routine of a reified technology and practice. If this ongoing transition can, according to

Gunning, offer useful tools for grasping the newness of old technology, similarly, technological transition from the past can help us in the investigation of the current transition.

From this perspective, this work addresses the question of whether the ongoing transition in film technology and practice is introducing a fundamental change in the nature of film, and specifically focuses on how it could affect the present and the future role of film archives. I will critically assess theoretical work on film and new media and repurpose it, seeking a new theorization of film archival practice in this transitional moment. I will investigate how film archives, by looking at film from the perspective of film and new media theory, could re-position film as a full participant within the new media environment, and how film archivists could re-think their profession and their relationship with the media environment.

Film archival practice is changing very rapidly and, with it, the way we look at the preservation of our film heritage. New forms of (digital) archives are being developed via the Internet that make use of participatory media to provide a significantly wider and more open form of access than any traditional archive has ever offered before. As a consequence, film archives and film museums are struggling with questions about their role. As a response, they could either close their doors to new media, or accept them and challenge some of their views and assumptions about the film medium. Whatever the choice, it will determine their future.

At this crucial moment of changing technologies and concepts there is insufficient dialogue between film archives and academia. Caught up in everyday practicalities, film archivists rarely have time to reflect on the nature of film and on the consequences deriving from new technologies on the viability of film as a medium. On the other hand, researchers investigating the ontology of the medium theorize future scenarios at a much faster pace than practice can keep up with, often without considering the material and institutional realities underlying the medium. This situation is leading to an increasing estrangement between theory and practice.

A constructive dialogue is needed along the lines of the International Federation of Film Archives Congress held in Brighton in 1978, which brought film historians and film archivists together to re-assess early film history, sparking something of a Renaissance in film studies and archival practice. If the Brighton Congress led film archives to open their doors to film historians, and, consequently, to a renewed academic interest for early films, this work strives to stimulate a closer relationship between film theory and film archives, by bridging the archival field, based on practical experience, and the academic field, open and free to elaborate on the nature and the consequences of changing media.

In this moment of transition from analog to digital, theorizing archival practice is not only urgent for film archives but also for media scholars. The kind of theorization proposed in this study aims at providing a common ground for a renewed dialogue between film archives and media studies. Such a dialogue will have a direct influence in determining how we understand, preserve and access our film heritage. As film undergoes its most recent, and perhaps most profound transformation, it is urgent that a theory of practice is developed today, while this transition is ongoing.

This work originates in particular from the need for a pragmatic approach, but is based on a sound theoretical reflection, as a response to the uncertainty that is strongly felt in the film archival field in this moment. Indeed, David Thorburn and Henry Jenkins point out:

> In our current moment of conceptual uncertainty and technological transition, there is an urgent need for a pragmatic, historically informed perspective that maps a sensible middle ground between the euphoria and the panic surrounding new media, a perspective that aims to understand the place of economic, political, legal, social and cultural institutions in mediating and partly shaping technological change. (Thorburn and Jenkins, 2003: 2)

In line with the above, the “conceptual uncertainty and technological transition” should be seen not only as the object of this research but also as the motive behind it, and the “pragmatic, historically informed perspective” is the one intended to be taken here.

Current debates on the impact of technological change for the medium have produced a broad spectrum of reactions stretching between two perspectives: one that identifies the advent of digital technology as a radical change in the nature of the medium (Rodowick, 2007; Cherchi Usai, 2005; Virilio, 1998; Baudrillard, 1995; Mitchell, 1982, among others), and the other that inscribes digital technology in a broader media landscape where film is one of the participants (Kessler, 2009; Gunning, 2004 and 2007a; Uricchio, 1997, 2003 and 2004; Thorburn and Jenkins, 2003; Bolter and Grusin, 1999; Manovich, 2001 and 2002; Elsaesser, 1998, among others). These two perspectives foster opposite interpretations with regard to the role film archives and museums should play in the future.

In the past decade, the archival community has often embraced the first perspective, tracing it back to Bazin’s reflection on the photographic image’s unique power of transferring the “reality from the thing to its reproduction” (1967: 14), a thesis dear to many film archivists. Taken to the extreme this approach fuels the idea that “digital film” is not film anymore, and that it therefore represents the end of film as we know it. Accordingly, digitization would mark the beginning of the end of film archives and museums, as they would stop collecting new material once analog photographic film disappeared.

On the other hand, according to theories embracing the second perspective, the advent of digital technology does not mark the end of film and, therefore, film archives should continue collecting, preserving and presenting moving images on whatever medium, including the digital one. From this perspective transition is in itself much more complex and in a way integral to the panorama of the media.

As this work intends to show, archival practices are changing with the new digital tools, and these changes apply also to those archives that may decide not to follow film after its turn into digits. For instance, the relationship with the audience is changing radically, as I will discuss later, and the film spectators that film archives have known are changing into users who expect to participate actively and have open access to archival collections. The question of whether film will disappear or not is at this transitional moment less urgent and relevant than the question of what impact the digital is having on film and on the work of film archives today.

What will become of film archives is a question that should be answered together by theorists and archivists. Only a dialogue between theory and practice can give form to a renewed archival theory that will make of future archives mirrors of a living media culture rather than repositories of dead media. This work aims at such a theorization using film restoration as its main focus.

The definitions of analog and digital are crucial for this work to identify the changes occurring in the technology and the practice, and how they impact on the current transition in film and archival practice. Discussing them is necessary as the terms are often confused and are used to categorize media in an inappropriate way. To start with, the definitions of analog and digital are complex by themselves. To avoid complicating the discussion beyond the aims of this work, I will have to limit my investigation of analog and digital with regard to technology.[3]

If we look at the dictionary, *analog* is defined as "of, relating to, or being a mechanism in which data is represented by continuously variable physical quantities." Whereas *digital* is "of, relating to, or using calculation by numerical methods or by discrete units."[4] Based on these definitions, analog's main feature is that of being "continuous," whereas digital's main feature is that of being "discrete."

This is further stressed and aptly exemplified by William J. Mitchell:

> The basic technical distinction between analog (continuous) and digital (discrete) representations is crucial here. Rolling down a ramp is con-

> tinuous motion, but walking down stairs is a sequence of discrete steps – so you can count the number of steps, but not the number of levels in a ramp. (1982: 4)

Note, however, that the definition of discrete may collapse into the definition of continuum, e.g. in the case of a staircase with infinitely small and adjoining (and therefore infinite) steps. If, according to Mitchell, analog and digital images are both "representations," Rodowick introduces a further differentiation when arguing that while an analog (photography) "transcribes before it represents" (2007: 78), a digital system in the first place "transcodes" (Rodowick, 2007 after Lev Manovich, 2001). Indeed, a digital system makes use of a numeric code (discrete elements, such as the steps in a staircase), for transcoding sound and light waves.

The distinction between analog/representing and digital/transcoding is further problematized by the concept of isomorphism.[5] As used by Rodowick (2007: 9), isomorphism for a representation medium implies the absence of a transcoding process (e.g. from waves into discrete numbers). But one may consider isomorphism in a different way and relate it to the observer. From this perspective also analog sound waves (or the analog video images) transcribed onto a magnetic tape would not be isomorphic, as the magnetic signal cannot be directly interpreted as sound or moving images by our senses. Also in this case a sort of transcoding process has occurred, even though within the "continuous" physical domain. Magnetic tapes, but also analog television, may well be considered part of a non-isomorphic representation process, even though they provide analog (continuous) representations.

Considering the above, the concepts of analog and digital do not help in distinguishing between those media that are intelligible for us and those that need transcoding to allow intelligibility. Analog photography and film, in the end, are a technological singularity since they are the only representation systems that are fully transcoding-free and isomorphic with the originating image, as photographic images are transcribed and stored in a way that is intelligible for us without any kind of transcoding process.[6] This is true unless we consider the chemical development of the latent image of a photograph as a transcoding process in itself.[7]

The idea that analog photography and film due to their singular full isomorphism are different from all the other media, puts the question of whether the advent of digital implies the beginning of an irreversible change in film in another perspective, as it suggests that the beginning of the change in film started already decennia ago with the affirmation of the (analog) television as a mass medium. This is also in line with the fact that broadcast archives are reacting very differently than film archives to the introduction of digital media. In this perspective the very debate analog versus digital and the related ontological question should be rephrased in a debate whether intelligible media (and in particular analog photography and photographic film) are ontologically different from the rest of audiovisual media that need transcoding.

In any way we may look at it, the debate is ongoing, and focusing only on the poles of the discussions (analog vs. digital, or isomorphic vs. nonisomorphic) is, in fact, less interesting and less productive than focusing on the middle ground. It is in the middle ground that things acquire their real dimension, namely in the very place of transition. The search for a "sensible middle ground" will be guiding this work in line with the idea, expressed by Rodowick in his *The Virtual Life of Film*, that digital film, even though other than analog film, is still profoundly related to it:

> As film disappears into digital movies, then, a new medium may be created, not in the substitution of one form or substance for another, but rather through a staggered displacement of elements. The electronic image has not come into being *ex nihilo* from the invention of digital information processing, but through a series of displacements in the relationship between the formative and constitutive of moving-image media: how an image is formed, preserved, placed into movement, expresses time, and is presented on detached displays. We may be confident in our ordinary sense that film, analogical video and digital video are relatively distinct media, without assuming that a medium is defined essentially by substantial self-similarity. Every medium consists of a variable combination of elements. In this respect, moving-image media are related more by a logic of Wittgensteinian family resemblances than by clear and essential differences. (Rodowick, 2007: 86)

In this view, even establishing an ontological difference between analog film and digital "film," would not necessarily lead to the conclusion that we are dealing with two different media forms. This is one of the aspects I will address in this work. I intend to problematize the discourse on film and media ontology and to discuss it in relation with the idea of transition, which is at the same time the object and the framing of this work.[8]

Whether the digital turn will ever be completed and the transition will end up in a fully digital environment, is to be doubted. Based at least on previous experience, old media never disappear completely. Accordingly, analog media will most probably not disappear altogether and will still have a place within the digital panorama. On the other hand, there is no doubt that digital technology is here to stay and to become more and more intertwined with our daily life. What is still open to discussion is what media will look like at the end of this transition and, again, if (this) transition will ever know an end.

If we consider transition as an inherent property of media, technological hybridism is its necessary characteristic. As a consequence, the very idea of the purity of a medium (the analog vs. the digital) should be reconsidered and, eventually, abandoned:

> To comprehend the aesthetics of transition, we must resist notions of media purity, recognizing that each medium is touched by and in turn touches its neighbors and rivals. And we must also reject static definitions of media, resisting the idea that a communications system may adhere to a definitive form once the initial process of experimentation and innovation yields to institutionalization and standardization. (Thorburn and Jenkins, 2003: 11)

In this perspective, if, as I think, transition is the most appropriate and productive term to define the process that film is undergoing at the moment, it seems also important to point out why it is useful and urgent to discuss this transition while it is happening.[9] There are at least two good reasons. The first one concerns the value of a historical record of events still taking place. The second resides in the possibility of exercising some kind of influence on the direction events are taking in the practice, in this case the practice of film archiving and film preservation.

Historical records of events taken *in medias res* benefit from a privileged point of view, that of those who do not know yet how the dice will roll in the end, where the ongoing developments will lead to and with which consequences. Although lacking the historical distance to put events in perspective, such a record would have had the advantage of not filtering its account either through a technological determinism *a posteriori* or by a teleological approach. Of course history is a discourse and not a mere series of facts and, therefore, recording the facts while they are happening is not interesting unless such a record is framed in a critical discussion.

To the question of whether it makes sense to theorize a still changing present, Lev Manovich answers in his seminal book on the language of new media that:

> […] even if the language of computer media develops in a different direction than the one suggested by the present analysis, this book will become a record of possibilities heretherefore unrealized, of a horizon visible to us today but later unimaginable. (Manovich, 2001: 7)

Like Manovich's, the research presented here is placed at the turn of the 21st century, at a juncture where technology is changing rapidly and media are transitioning into new forms. Differently from Manovich, who looks at the language of new media in terms of emergence of a new medium (Manovich, 2001: 6), I propose to look at it in terms of transition. Of course, making sense of this transitional phase is not an attempt to read the future, for we cannot possibly know what is yet to come.

As mentioned earlier, a second reason why it is important to discuss transition *in medias res* is the chance it also brings along to influence the course of the events in the practice. It is not indifferent in this regard that the researcher of this work embodies two roles, that of the scholar, who addresses the ongoing transition, and that of the curator, who looks for answers to shape the future practice of film archives. It is from both roles that I aim to formulate an archival theory that may be a useful reference, a point of departure for those film archive professionals who are disoriented in this technological transition.

In this work, the historical, social and cultural framing accompanying changes in technology and practices will be taken into account. In particular, the discussion within and about the field and its dynamics will be central. With this respect, Uricchio's view will be embraced:

> [...] new technological capacities achieve (new) media status through a series of struggles over identity, representational capacity, business model, mode of production, regulatory frameworks, and so on. Historically, such struggles have been profoundly social, resulting in cultural and institutional consensus around a particular set of constructions, the new medium of the moment, effectively marginalizing many viable alternatives. (Uricchio, 2002b: 220)

It is the aim of this work to look at these struggles and to take a snapshot of a field in transition at a moment when the future of film is being profoundly reshaped, from production to preservation and exhibition.

Although in agreement with Manovich that cinema is going to be replaced by digital media (2001), this work challenges his teleological approach to technology in accordance with Frank Kessler, who points out that Manovich's approach leads to the conclusion that:

> Film history is in a certain way part of the pre-history of new digital media. The new medium causes a shift of perspective on the history of the old medium. The latter acquires now, as it were, a new *telos*. (2002: 14-15 – my translation, emphasis in the original)

This study will focus mainly on the transitional aspect of the technology, the practices and the field. Also, it will be looking at the changes in both new and old technologies and the way their transition reflects upon the film archival field. This approach is in line with the idea, put forward by Jay David Bolter and Richard Grusin, that new media "emerge from within cultural contexts, and they refashion other media, which are embedded in the same or similar contexts" (Bolter and Grusin, 2000: 19). In this technological transition it is the field of film archives and that of film studies that are being reshaped and archivists and scholars are also agents of the reshaping process.

The investigation of such changes, which are social, technological and cultural at the same time, needs a suitable research method. In the second part of this book, in order to investigate both the field and the changes in technology and practice as interrelated processes, I have looked at approaches offered by social studies and, in particular, those studies focusing on the social construction of technologies. This branch of academic work stems from a reaction to the technological deterministic approaches of the 1980s. There are several theoretical approaches that arise from here and they all ask related questions, as, for instance, the Social Construction of Technology (SCOT).[10]

The SCOT theory, in particular, which has previously inspired, among other scholars, Karel Dibbets, with his work on the introduction of sound film in the Netherlands (1993), has been used in the second part of this study as a reference theoretical tool to analyze a number of recent and innovative film restoration projects and a selection of the major players in the film archival field. Since SCOT focuses on the interrelation between social players, or "relevant social groups," and artifacts, it aptly applies to my case where archival institutions interrelate with the artifact film, facilitating its transition from analog to digital.[11] SCOT is a suitable instrument for studying a transitional process at the same time influenced by and influencing a large number of players and cutting across various layers (technological, economical, social, cultural, etc.). Another reason why I find SCOT particularly apt is its focus on collective agency, such as institutions and organizations, rather than individual agency (Bijker, 1995: 192). Indeed, I will focus mainly on institutions and organizations such as film archives, film laboratories, professional associations, international projects, rather than on individual film curators, restorers or inventors of specific film restoration tools. However, the role of individual actors is acknowledged by SCOT as well, and actors will be taken into consideration in this work, in particular in their role of promoters of knowledge exchange between different professional groups and institutions. In addition, in this work I also embrace SCOT's rejection of a deterministic approach to technology.[12] Differently from SCOT, though, this work focuses on the artifact (i.e. archival film) and on the social groups and the practices around it, while the artifact is in transition. This introduces differences with the typical SCOT case study, which looks mainly at past transitions. Also the point of view of this work is different from SCOT's, as it is situated within that very transition it intends to discuss.

There are many social groups relevant to this work, from filmmakers to film restorers, from film production companies to film archives, from film laboratories to film exhibitors, from manufacturers of film and film equipment to providers of hardware and software, from funding entities to professional organizations. They are all influenced by the current transition of archival film and, in turn, they all contribute to it. Although I will touch upon many of these groups, especially in the larger snapshot of the technological transition in Chapter One, I will mainly focus on those that are closer to the artifact archival film and that have a more direct influence on its very life. What I call the *archival life of film* indicates the life of film once it has entered the archive, from selection to preservation, from restoration to exhibition and digitization. The social groups that have a direct and material influence on the *archival life of film* are those of film archives and film laboratories. Archives in particular belong to the group that has to respond in the first place to issues concerning preservation, restoration and access of film heritage.

Since the term film archive, as I use it in this work, indicates different kinds of cultural institutions (e.g. film and audiovisual archives, film museums and *cinémathèques*), I think it is useful to take a brief look at the differences between these institutions. The relevance of this closer examination bears also on the question of whether they should adopt different approaches with respect to, and as a result of the transition to digital.[13]

The main difference between archives, museums and *cinémathèques* is in the way they exhibit their films, in accordance with their mission statement. Differences in the nature of the collection, on the other hand, are rather scattered and elude the designations above.[14]

Most film museums and *cinémathèques* are usually characterized by an active exhibition policy. This is typically realized in one or more public screening theaters run by the institution itself; here films from the collection are shown regularly, alongside films from other archives and contemporary distribution titles. In some cases, together with the film screenings, these institutions also display (part of) their film-related collection in an exhibition space.[15] Film archives, on the other hand, usually do not take upon themselves the exhibition of their collection to the public in a theater. For instance, the CNC (Centre national du cinéma et de l'image animée) does not have a theater to show its collection, as exhibition is not part of its mission.[16] However, even in such a case, promotion and distribution are realized as the collection is shown at festivals and in movie theaters.

This distinction between museums and *cinémathèques*, on one side, and archives on the other, however, is losing relevancy as digital technologies offer today many more means of exhibition than traditional film projection alone. In this respect, a distinction on the basis of theatrical exhibition of films can be easily disputed. In this work the changing practice of accessing film archives will be discussed in relation to new possibilities offered by digital technologies. I divide here access practices into three categories: access by the broader public via video or digital reproductions, cinema distribution to audiences outside the archive, and cinema exhibition to audiences inside the archive.[17]

In addition to the difference in their accessing policies, film institutions of course vary greatly in their origin, scale, structure and funding, as pointed out by Penelope Houston (1994: 5) with regard to the institutions affiliated to the International Federation of Film Archives (FIAF).[18] Film institutions can be entirely public (e.g. regional or national film archives such as Centre national du cinéma et de l'image animée – CNC, Library of Congress – LoC, Danish Film Institute – DFI, and many more) or private (such as Hollywood studios' archives or private collections like the French Lobster Films), or partly subsidized with public money (such as Eye Filmmuseum and the Fondazione Cineteca Italiana). As a consequence, their policies for collecting preserving and exhibiting can differ greatly. For instance, most archives limit their scope to national productions, whereas Hollywood studios' archives and, in general, private archives deal only with films for which they hold the copyrights, regardless of their origin. For example, Sony Picture Entertainment recently restored Michelangelo Antonioni's *Professione: Reporter* (also known as *The Passenger*, IT, 1975), even though it is mainly an Italian production, and Lobster Films does not limit its collection to French films.[19] Eye Filmmuseum, on the other hand, besides its "archival function," which is limited only to national film productions, also collects, restores and exhibits non-Dutch films, on a selective basis.[20]

However different, most film institutions collect and preserve films (and often film-related artifacts such as cameras, projectors, posters, stills and filmmakers' paper archives) according to their specific policies and in proportion to their financial means. All members of FIAF are non-profit institutions and follow the Federation's code of ethics, which sets general rules regarding preservation and exhibition of films.[21] In general, for-profit archives also follow most of the rules set by the FIAF.[22] Despite the generalizations above, the way film institutions respond to the transition to digital should be considered for each single case, based not just on their designation but on their mission statement, their objectives and, of course, the origin of their funding. Note that film archives, museums and (most) *cinémathèques* are all concerned with collecting, preserving and promoting films.[23]

It should also be pointed out that, besides FIAF, there are a number of professional organizations that have an important role in coordinating and circulating debates within the archival field, especially in this time of transition. Some of the more relevant organizations will be touched upon in this work. They include AMIA (Association of Moving Image Archivists), ACE (Association of European Film Archives and Cinémathèques), SEAPAVAA (South East Asia Pacific Audio Visual Archive Association), FIAT/IFTA (International Federation of Television Archives), SMPTE (Society of Motion Picture and Television Engineers), EBU (European Broadcasters Union).

In this sketch of the archival field I need also to clarify my own personal position as a film archivist and, therefore, as a player within the very field I am researching. Rodowick recalls that in the 1970s “film history was a pursuit based on scarcity” and “the only way to see a film was to see it projected,” and that after 1989 “only a few short years marked the transition from scarcity to an embarrassment of riches, though at a price: *film had become video*” (2007: 26 – emphasis in the original). My own personal experience has been quite different. In 1989 I started studying film and only then non-contemporary film became something other than televisually broadcast movies or rented video cassettes. Seeing (non-contemporary) film projected on a screen was, after 1989, an eye-opener in terms of visual pleasure and, more specifically, photographic quality, as these were incommensurably better (and other) than what I had experienced before on television. On the other hand, film prints available in the late 1980s and early 1990s were almost as scarce as those available to Rodowick in the 1970s (and probably often the same ones). Available prints were most of the time in bad shape, bearing the signs of a long life of projections. During those years, film restoration took its first steps as a self-conscious discipline, and a few film archives and specialized film festivals (such as Le Giornate del Cinema Muto and Il Cinema Ritrovato in Italy, and Cinémemoire in France) spread the message that films needed active restoration in order to be properly experienced.[24] Although preservation and philological reconstruction of incomplete films was already an existing archival practice, the emphasis on restoring the pristine photographic quality of archival films started to be consciously addressed only in those years. Along with it the archival community started shifting from an idea of “original” focusing on philological integrity (in other words, the reconstruction of the complete narrative of a film), to an idea of “original” that foregrounded the material integrity (reconstructing the narrative by recurring to the most original material artifacts available). My initial interest and passion for film started in this environment, quite different from Rodowick’s. The ideal of restoring the “original” beauty of films as seen in projection led me to this profession. The advent of the digital was almost synchronic with my first year working in a film archive (1996-1997), since in 1997 one of the first full digital restorations, *The Matinee Idol* (USA, 1928), was carried out.

My positions as film archivist and as researcher will at times overlap, as this study is also based on my professional experience and on a broad range of contacts and collaborations. Conversations with leading figures in the field, from film archives, research institutes, film laboratories and funding entities, have been used to support the analysis of the research. Also, the discursive range this work draws from includes academic assessments, professional journals, papers from media-analysts, as well as from motion picture engineers, and, of course, personal opinions expressed by filmmakers and by film archivists. Throughout these pages I intend to keep my position as researcher as distinct as possible from that of film archivist.

In this work I investigate the interplay between film and media theory and film archival practice in this time of transition from analog to digital and, based upon this investigation, I propose a new theorization of archival practice. I aim to demonstrate that practice is in a constant state of transition, characterized by a growing hybridization between analog and digital technology, and that an appropriate theorization of archival practice is not only relevant and necessary, but urgent for such a transitional practice, producing ever changing film (archival) artifacts. Therefore, I invoke a renewed mindset for both film archivists and film scholars and a renewed dialogue among them.

The first part of this research addresses the transition film is now undergoing, from both the perspective of the practice, in film production and film archiving, and the theoretical perspective, in film and new media studies. I have divided this first part of the study in two chapters, the first focusing on the practice and the second on the theoretical discussion. In the second chapter I also elaborate a new theorization of archival practice inspired by both theory and my own practical experience. Since I invoke a dialogue between film archivists and film scholars, I have chosen to speak to both of them in this work.

In Chapter One I investigate how new technological changes are influencing the practice of film production and of film archiving. Since my focus is on film archiving, the discussion on changes in film production due to the digital is limited to a number of areas that clearly have a bearing on film archival practices. This chapter is first of all an effort to create a detailed snapshot of a practice in transition that I feel is still missing in the literature. Whereas a number of reference publications exist with regard to traditional photochemical film restoration (e.g. Read and Meyer, 2000), a detailed technical description of the available tools and the viable practices for digital restoration of archival films is not yet available at the time of writing.[25] Furthermore, a close snapshot of the current practices and a detailed description of the technical possibilities available in the period 1997-2007 is a necessary reference for the discussion of the film restoration case studies analyzed in this work. In Chapter Two I look at how theoretical debates address the transition to digital, with particular attention to the most relevant recent developments in media studies and to the discussion on film ontology. The question is addressed whether film's ontology changes with the transition to digital, and a number of approaches are discussed that more clearly bear on the conceptualization of archival films. I also propose a number of frameworks and concepts as a basis for a new and digitally informed theory of film archival practice, which is suited for the transitional character of film. I would like to point out that my use of frameworks and concepts, derived from film and new media studies, is pragmatic and instrumental for my new theorization of film archival practice. My theorization intends to comprise the different conceptions of the nature of (archival) film already existing in the field. However, I also propose a new way to look at film's nature, from the perspective of transition. I will argue that such an approach can be productive for understanding the current transition from analog to digital.

The second part of this study puts the proposed theorization to the test with a number of relevant social groups from the film archival field and film restoration case studies. In Chapter Three I investigate the different approaches to film archival practice, in particular those of film archives, laboratories and funding entities, in relation to the proposed frameworks and concepts. In Chapter Four I critically examine how this new theorization bears on current archival practice by discussing a number of relevant and innovative film restoration case studies, carried out by the entities discussed in Chapter Three, that have been realized right in the middle of the technological transition from analog to digital (1997-2007). The case studies I have examined include both restorations carried out by me or under my supervision (Fossati, 2006), such as *Zeemansvrouwen* (NL, 1930) and *Beyond the Rocks* (USA, 1922), and restorations from other leading archives, such as *The Matinee Idol*, (USA, 1928, by Sony) and *Mahagonny* (USA, 1970-1980, by the Harry Smith Archives and Anthology Film Archives).

In this second part I turn to some of the analytical tools offered by the SCOT theory as they provide an appropriate and productive reference for organizing my cases and relevant social groups, and for explaining the dynamics that are taking place. The comparative analysis of specific restoration case studies, social groups and relevant theoretical discourse will reveal the interplay between theory and practice. In particular, the discussion of case studies will focus on all the decisions and their consequences, which are, consciously or not, related to questions regarding film ontology. Each selected case provides an opportunity to discuss and to test the earlier proposed frameworks and concepts in relation to the issues, such as the extent of the restoration interventions, the respect of the original artifact, and the transparency and reversibility of the choices made.

Like any study, this one also has limits. I would like to mention three of them in particular. First of all, I am not addressing broadcast archives, and I mention television only incidentally. The second limitation is geo-cultural, as this study focuses mainly on Western realities, including Europe and North America. The third one regards home-movies, amateur cinema and films produced within film schools' programs, all of which have been increasingly produced with digital means in the last decade, but could not be treated in this study. These have been painful but necessary exclusions.

For ease of reference, I have added a concise technical glossary to this book. All terms included in the glossary are highlighted in SMALL CAPITALS throughout the text.

PRACTICE AND THEORY OF (ARCHIVAL) FILM

In the first part of this book I discuss the transition from analog to digital technology, firstly from the perspective of film (archival) practice and, secondly, from that of film and new media theory. Here I also introduce a new theorization of archival practice.

In Chapter One I provide a snapshot of some of the most relevant changes in film production and film archival practice that are occurring at this time of transition from analog to digital technology. Such a snapshot will show how the combination of the new digital tools and the well-established analog ones has led to a high level of hybridization in technology and practices, both in film production and in film archiving. In this chapter some of the tensions and questions regarding the nature of film will start to take shape through the debates around the new technology, the new tools and, especially, their application in everyday practice.

In Chapter Two I focus on the debates around the nature of film by looking at how film and new media theories are reflecting on this transitional moment and, in particular, how theoretical studies are addressing the question around film ontology in view of the digital. Here I identify relevant frameworks and concepts as a basis for a new theorization of film archival practice. Such frameworks and concepts can serve as tools to analyze the transition from analog to digital in current film archival practice. This analysis will be carried out in the second part of this work where the interplay between practice and theory will be further developed.