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NOTES

1 Among the many studies dedicated to technological transitions in the history of audiovisual media, refer to Gomery (1976), Dibbets (1993), Zielinski (1999), Gitelman and Pingree, eds. (2003). Also, an important series of conferences on this topic has been regularly organized since 1999 at the Massachusetts Institute of Technology.

2 This has been the case in the past decennia as Gordon E. Moore predicted in 1965 (Moore, 1965). Indeed Moore’s law foresees that the number of transistors contained on microchips (i.e. the processing power of microchips) is doubled roughly every eighteen months.

3 Refer, among others, to Barthes (1964) for a discussion of analog and digital from a semiotic perspective.


5 Refer also to the dictionary definition of “isomorphic”: “being of identical or similar form, shape, or structure” (http://www.merriam-webster.com/dictionary/isomorphic).

6 Note that this is not true for the sound accompanying the image on a film strip even when it is stored as an optical track, as we need an additional transcoding process to be able to hear it.

7 As we will discuss in Chapter Two, Tom Gunning suggests something along this line when he writes that “Both photographic chemicals and the digital data must be subjected to elaborate procedures before a picture will result” (2004: 40).

8 In this study, the definition of framing, as proposed by Mieke Bal (2002: 133-173), following Jonathan Culler (1988), is preferred above that of context. As offered by Bal, framing refers to an activity (2002: 134-135), whereas context refers to stasis. As the object of this research, media in transition, is everything but static, the use of the concept of framing seems the only appropriate one.
It should be pointed out, however, that the idea of transition is in itself a construction of historiography and, more precisely, a tool to define a particular moment in film history.

SCOT is a constructivist approach to the study of the development of science and technology, primarily developed by Wiebe Bijker and Trevor Pinch. According to SCOT theory, the success or the failure of a technology should be defined by looking at different groups and stakeholders in the field, and, in particular, at those who define the technical criteria by which success is measured (Pinch and Bijker, 1984; Bijker, 1997; Bijker, 2001). Here, “constructivist” means that the truth of scientific facts and the working of technical artifacts are studied as accomplishments – as being constructed – rather than as intrinsic properties of those facts and machines. The term “social construction of technology” can be used to denote two different things. First, it is a research approach to study technical change in society, both in historical and in contemporaneous studies. Second, it is a theory about the development of technology.

“Technological development should be viewed as a social process, not an autonomous occurrence. In other words, relevant social groups will be the carriers of that process” (Bijker, 1997: 48; see in general 45-50).

“Technological determinism was taken to comprise two elements: (a) technology develops autonomously, and (b) technology determines societal development to an important degree. This view was seen as intellectually poor and politically debilitating. Technological determinism implies a poor research strategy, it was argued, because it entails a teleological, linear, and one-dimensional view of technological development. In addition, it was considered politically debilitating because technological determinism suggests that social and political interventions in the course of technology are impossible, thus making politicization of technology a futile endeavor” (Bijker, 2001: 15523).


It should also be noted that these names are often historically accreted terms, which reveal institutional history sometimes even more accurately than institutional goals.

This is the case of museums such as the Museo Nazionale del Cinema di Torino, the Deutsche Kinemathek and the Cinémathèque Française. Refer also to the issue of Film History. An International Journal (3, 2006) dedicated to this kind of film museum.

The following missions can be found on the CNC’s website (www.cnc.fr): “regulatory; support for the film, broadcast, video, multimedia and technical industries; promotion of film and television for distribution to all audiences; and preservation and development of the film heritage”.

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A similar distinction is also made by Sabine Lenk in the *Manual for Access to Collections*, compiled on behalf of FIAF Commission for Programming and Access to Collections (Lenk, 1997). However, when the *Manual* was written, digital reproduction of films was not yet taken into consideration.

According to the FIAF website (www.fiafnet.org), the federation counted 141 affiliates on January 1, 2007.

For a discussion of copyright issues and so-called legal deposit policies, which both differ by state and exercise a great influence on the adopted collection policy, refer to Gorini, 2004.

The Nederlands Filmmuseum’s collection policy, which will be discussed in detail in Chapter Three, knows a distinction between an archival function and a museum function: the preservation of Dutch film heritage falls within the museum’s archival function, whereas the collection and preservation of non-Dutch items, films and film-related objects, is considered a museum function.

In Chapter Two, FIAF Code of Ethics will be further discussed and questioned in relation to the changes due to digital means.

In the section on exploitation rights of the FIAF Code of Ethics, it stated that: “screenings will be non-profit making (which is not to say that screenings will necessarily be free, but that where entry fees are charged the income deriving from such fees will be demonstrably linked to the preservation and cultural mission of an archive, and not devoted to the commercial reward of any individual, group or organisation)” – see http://www.fiafnet.org/uk/members/ethics.cfm

Note that there are institutions using this designation that do not hold a film collection at all and, consequently, do neither collect nor preserve films. One example is the American Cinémathèque in Los Angeles, whose goals of promotion and exhibition of heritage film are exercised in two historical movie theaters where films from archives around the world are regularly shown. Similar are the cases of the Melbourne Cinémathèque and the Pacific Cinémathèque in Vancouver.

Some of the earliest articles entirely devoted to the subject of film restoration were written around this time (Pinel, 1985; Cherchi Usai, 1985; Borde, 1986; Patalas, 1986; Meyer, 1986; Bowser, 1990; Canosa, 1992; Farinelli and Mazzanti, 1994). It should, however, be noted that the practice of film preservation has a much longer tradition, and FIAF has long before the 1980s published hand books for film archivists on duplication of archival films and other related technical issues.

Whereas I am not aware of published studies dedicated to digital film restoration in detail, a number of articles do tackle the issue in relation to specific case studies, such as Fossati (2006) and Wallmüller (2007).


This is the case, for instance, for the White Stripes, who write on the inlay of their album *Elephant* (2003): “No computers were used during the writing, recording, mixing or mastering of this record.”
29 “Foley editing” refers to the “process of adding sound effects such as footsteps and environmental sounds to films.” This process is named after Jack Foley, indeed the first “Foley artist” in Hollywood (http://en.wikipedia.org/wiki/Jack_Foley).
30 http://www.dolby.com/about/who_we_are/chronology.html
32 The relation between economics and sound technology in film was first addressed with regard to the transition to sound in the early 1930s. In particular, Douglas Gomery has looked at the advent of sound in the American film industry “in terms of economic theory of technological innovation, which posits that a product or process is introduced to increase profits in three systematic phases: invention, innovation, and diffusion” (1976: 193). It is mainly with regard to diffusion that compatibility on a large scale becomes a crucial factor.

33 With regard to the definition of what is considered analog and what digital in this work, refer to the discussion in the Introduction.
34 The THX tradename is not an acronym but it refers to George Lucas’ first film, THX 1138 (1971). THX was developed by Lucasfilm in 1983 upon realizing cinemas’ poor audio standards. The Return of the Jedi (1983) was the first film to be played in THX-certified cinemas.
35 One of the few contributions from the field to this issue is that of Lerouge, 1996.
36 Each single turning point discussed in this chapter should be positioned within the broader transitional phase in which it takes place. Refer to the Introduction for a discussion on transition of both the object and the point of view of this study.
37 It should be noted that, although the practice of negative cutting remains unchanged with digital editing, the “creative” part of the editing work was carried out on a so-called work print. By splicing together film shots in a work print, the editor used to make those editing decisions that, with digital editing, are made with a computer.
38 The negative cutter is one of those traditional film craftsmen that are listed at the very end of a film’s credits and that is essential to the realization of all films, with the exception of only a few made in a very limited number of takes, like Hitchcock’s Rope (1948) or Miklós Jancsó’s Red Psalm (Még kér a nép, 1972).
40 The term “synthespian”, i.e. a synthetic actor, was introduced in the late 1980s by Jeff Kleiser and Diana Walczak (http://www.synthespians.net/), creators of computer-generated characters. The term is used, among others, by Cubitt (2002).
41 For more examples of digital effacing, refer to Prince (1996: 27-28) and to Chapter Four.
42 For a historical overview of the DI process, see Read, 2006: 120-122.

43 Note that a new film stock was put on the market thanks to this little photochemical experiment: “[…] Sigel shot the scene with Kodak’s 5285, a reversal stock he actually had a hand in bringing to the market. ‘I’d previously used bulk loads of various still-photography films in doing this kind of work, including Kodak’s Ektachrome Professional Plus. But for Three Kings, I knew we were going to do a huge chunk of the film with it—the entire second act—so I asked Kodak to make us 1,000-foot loads of Ektachrome with edge-coding and Bell & Howell perfs. They were very hesitant to do it, but we ended up shooting 200,000 feet of it, so they were happy in the end’” (Williams, 2000: 3).


47 For more on the cinematography of Collateral, refer to Jay Holben, “Hell on Wheels,” American Cinematographer, April 2004: http://www.theasc.com/magazine/aug04/collateral/page1.html


50 The source of these figures is a thorough research carried out by MEDIA Salles, an initiative of the MEDIA Plus Programme of the European Union published in the European Cinema Yearbook – Advance Edition, 16th edition, 2007: http://www.mediasalles.it/ybk07fin/

51 Distributors cannot force exhibitors to invest in digital projectors if there is no clear financial benefit for them. On the other hand, distributors are not going to digitize the distribution chain if exhibitors are not equipped for showing their digital films.

52 Refer to Gomery (1976) for the USA and to Dibbets (1993) who focuses on the transition to sound in the Netherlands.

53 European Digital Cinema Forum (EDCF) was constituted in Stockholm, Sweden, on June 13, 2001, on the initiative of the Swedish Presidency, its main objective being to function as a network for European co-operation on e- and d-cinema activities.

54 “The Pilot Project scheme constitutes the way in which the MEDIA 2007 programme ensures that the latest technologies and trends are incorporated into the business practices of beneficiaries of the programme. The programme continues to support pilot projects to ensure that the latest developments on the information and communication technology markets are introduced and taken up by
the players of the European audiovisual sector.” (http://ec.europa.eu/information_society/media/newtech/pilot/index_en.htm).

55 http://www.cinemaneteurope.com/
56 http://www.ukfilmcouncil.org.uk/cinemagoing/distributionandexhibition/dsn/
57 http://www.dcimovies.com/
59 Note that most technical definitions included in the DCI document are also discussed in Silva, 2006; see also Sætervadet, 2005: 239-248.
60 http://www.dcimovies.com/DCIDigitalCinemaSystemSpecv1_2.pdf
61 See among others Brownlow, 1980.
62 The text of the open letter “Frames Rates for Digital Cinema Projection of Film Originated Material” was kindly provided to the author by Paul Read, member of the FIAF TC, on June 10, 2007. With regard to this discussion, refer also to Nowak and Fössel, 2008.
63 The term dispositif defines here, in broad terms, the viewing situation where a film meets its user. The origin and use of this concept will be discussed later in detail.
64 See http://www.tape-online.net/docs/Tape_survey_factsheet.pdf:5 and http://www.tape-online.net/docs/tracking_the_reel_world.pdf
65 European broadcast archives such as the British BBC, the Italian RAI, the French INA and the Netherlands Institute for Sound and Vision are collaborating in the project PrestoSpace (http://prestospace.org/), discussed in Chapter Three, for researching the viability of digitization on a large scale. Another important project in this respect is Video Active (http://videoactive.wordpress.com/), whose aim is to create access to European television content and build a bridge between broadcast archives (BBC and the Institute for Sound and Vision, among many others) and universities (e.g. Utrecht University and Royal Holloway, University of London).
66 In this area some of the most precious research has been carried out by James M. Reilly and Jean-Luis Bigourdin at the Image Permanence Institute based in Rochester, NY (see http://www.imagepermanenceinstitute.org/index.shtml and among several articles, Bigourdan, 2006), Michelle Edge at Manchester Metropolitan University, UK, and the Australian National Film and Sound Archive with their excellent Preservation Handbook (see http://www.screensound.gov.au/preservation/film_handbook/).
67 Probably, as has been the case of vinyl for the music industry, celluloid will maintain a niche market also when most film production and distribution is completely digital. A similar case in the film business has been that of the Super8 format that was announced dead since the introduction of video cameras for the customers’ market; however, Super8 is still produced and used by a small but stable number of filmmakers.

See http://wiki.prestospace.org/pmwiki.php?n=Main.WhatIsPreservation for the definition of “maintenance” as intended within the scope of the Presto Space project and by Richard Wright in particular.

http://viia.ascentmedia.com/


http://www.variablemedia.net/

For more information with regard to LOCKSS, see http://www.lockss.org and refer to Uricchio (2007: 22-23). With regard to DISTARNET see http://www.distarnet.ch/

For an overview of the definitions given for the terms preservation, conservation and restoration, refer to Karen F. Gracy (2007-II: 259-263). It should also be noted that often the terms preservation, duplication, re-mastering are all used to refer to what I define here as restoration.

In this regard Meyer points out that: “When new technologies are discussed it is usually meant the digital. In film preservation, however, there is definitely still innovation as for the analog.” (Meyer, 2004: 29 – my translation).

Note that for digital still and video cameras the total amount of pixels in the picture is usually mentioned (e.g. 2 Megapixels). For *digital cinema* it would be impossible to name a constant amount of total pixels as the aspect ratio may change per film. In the case of digitizing a silent film, for instance, 2K resolution means a total of more than 3 Megapixels (2048 horizontal pixels x 1556 vertical pixels) whereas a modern widescreen sound film, digitized at 2K would result in 2,2 Megapixels (1920 x 1080). Refer to the following website for an overview of different resolutions: http://web.forret.com/tools/megapixel_chart.asp

The relation between the number of tones and the corresponding (linear) bits is exponential: 1 bit (2¹) = 2 tones; 2 bits (2²) = 4 tones; 8 bits (2⁸) = 256 tones; 24 bits (2²⁴) = 16,777,216 tones; etc.

In film one refers to the depth of a single color. An 8 bit depth for a single fundamental color (red, green and blue) corresponds to 24 bit depth for the three fundamental colors together.


With regard to these software packages, refer to http://www.mtifilm.com/correct.html; http://www.geniusofdavinci.com/revival/index.htm (this software was
used for the digital restoration of *Dr. Strangelove* (UK, 1964), carried out by the laboratory Cineric in 2006 on behalf of Sony Picture Entertainment, which will be further discussed in Chapter Four); http://www.hs-art.com/diamant.html (the Diamant software was used for the restoration of *Beyond the Rocks* (USA, 1922), also discussed in Chapter Four).


82 Duplication under liquid (*wet gate*), which is typically used in photochemical duplication, can only deal with the superficial scratches that have not reached the emulsion layer where the image is formed.


84 For a discussion of color in silent films, see Cherchi Usai, 1991 and Fossati, 1996 and 1998. The matter of digital restoration of color in silent films will be treated further in Chapter Four in relation to the restoration of *Beyond the Rocks* (USA, 1922).

85 This technique is named after its inventor, Noël Desmet, head of the film laboratory at the Cinéthèque Royale du Belgique. See also Read and Meyer, 2000: 287-290 and the excellent thesis focusing on this subject by Annike Kross (Kross, 2006).

86 For a discussion on different methods for restoring colored silent films, see Fossati, 1996.

87 For more information on early color systems, refer to Enticknap (2005: 74-97) and Read and Meyer (2000: 195-209), who efficiently summarize the subject writing with the following: “Some 150 different colour film systems have been devised and a number have reappeared under different names on several occasions. Fewer than this have been commercially successful. After 1950 only one general system has been commercially successful. This is the use of integral tripack films, either with the dye coupler incorporated in the emulsions (Eastman Color, Fujicolor, Agfacolor, Gevacolor, etc.), or with the dye couplers in the developer (Kodachrome, early Fujicolor, etc.). The Technicolor imbibition printing method, using integral tripack negative as camera film, lasted until 1978 in the USA and UK.” (Read and Meyer, 2000: 195).

88 Magid, 1997: 56.

89 Refer to Canosa (1992 and 1997) for a discussion on film restoration from the perspective of classical restoration theory and on the importance of documenting the restoration process. Refer also to a recent article by Julia Wallmüller (2007), who proposes theoretical guidelines for digital restoration based on concepts derived from classical restoration theory.

90 See, for example, Koerber, 2000.

91 The latter example refers to the so-called “social tagging”, which includes the possibility for Internet users to add comments to an on-line item, for instance, to
a video, as in the case of YouTube. A number of museums are experimenting with this feature in their on-line catalogues in order to enrich the metadata related to their collection’s items and to open up to the public. Social tagging goes beyond metadata as it is related to the emerging “social media” (e.g. web logs, wikis), which, as pointed out by Uricchio (2007: 16), “lack any homologies to traditional archival objects.” This area, though, falls outside the scope of this work. For a discussion on this phenomenon, refer to Uricchio (2007) and De Jong (2005). Also, refer to De Jong (2003) for a discussion on metadata of audiovisual archives. It should also be noted that a discussion is ongoing within the archival field whether YouTube should be considered an archive. One of the main issues concerns its policy for long-term preservation, which is considered a core task of archives. This deserves to be discussed at length but goes beyond the scope of this work.

Refer also to http://www.imagesforthefuture.org/

Examples of this trend are those of large broadcast archives, like BBC, and large state archives, like Library of Congress. Refer also to the study Digital Dilemma carried out by the Academy of Motion Pictures and Science (A.M.P.A.S., 2008).


The age by which films pass on to the public domain is defined differently by each country of production. In the US, for example, all films produced before 1923 fall under public domain.

For an overview on legal issues regarding protection and access of cinematographic heritage in Europe, with a focus on “legal deposit” and related questions arising from the introduction of digital media, see Gorini, 2004.

Examples of these touring programs are: Dutch Silent Cinema distributed by the Filmmuseum, Biograph distributed jointly by British Film Institute and the Nederlands Filmmuseum, American Beauties by Library of Congress and Unseen Cinema by Anthology Film Archives.

This definition and other thoughts expressed here on the subject of access and distribution of archival films were first introduced in Fossati and Verhoeff, 2007. Also, refer to the definition of “moving image stewardship” introduced by Karen Gracy (2007-I).

Examples of archival DVDs are Exotic Europe and Cinéma Perdu (Nederlands Filmmuseum), Treasures from American Film Archives (National Film Preservation Foundation), Unseen Cinema – Early American Avant Garde Film 1894-1941 (Anthology Film Archives).

http://www.wired.com/wired/archive/12.10/tail.html; See also: http://www.thelongtail.com

http://creativecommons.org

For more on this, see Houston, 1994. A friction between showing and preservation seems to be an unavoidable aspect of archival practice and the new possibili-
ties offered by digital technology are adding new challenging perspectives to this complex matter. See also Nissen et al., 2002.

http://www.archive.org


Significant grants have been given, for instance, by the Rockfeller Foundation to the Museum of Modern Art (MoMA) for building a film preservation center and, later, by John Paul Getty Jr. to build the National Film and Television Archive (NFTVA) in Berkhamsted, England (see Houston, 1994: 90). It is also only from the late 1980s, early 1990s that the Nederlands Filmmuseum has received a substantial budget for film preservation from the Dutch Ministry of Culture, thanks to a renewed and extremely pro-active collection and preservation policy (Lameris, 2007: 63-67).

There are a few exceptions where the conceptual dangers posed by studying film restorations have been explicitly addressed, e.g. the past editions of the Amsterdam Workshop held at the Nederlands Filmmuseum (1994, 1995, 1998 and 2004), which have been characterized by an open dialogue between the two fields based on the screening and analysis of restored film prints. The seminar “Film Archives in the Digital Era”, was promoted by the EU program Archimedia and organized jointly by the Nederlands Filmmuseum and the Danish Film Institute in 2003 (Walsh and Read, 2003). Also, the Orphans Film Symposium and archival festivals such as Le Giornate del Cinema Muto (Pordenone) and Il Cinema Ritrovato (Bologna) offer the possibility for scholars and archivists to informally discuss restored films.

Refer in the latter case to the “cultural artifact” as defined on Wikipedia: “[…] a human-made object which gives information about the culture of its creator and users. The artifact may change over time in what it represents, how it appears and how and why it is used as the culture changes over time.”: http://en.wikipedia.org/wiki/Cultural_artifact (retrieved on 18 October, 2008) For a discussion on the film artifact, refer also to Cherchi Usai et al., 2008: 83-106.

Film cannot be easily categorized together with other artforms. For instance, film can hardly be placed in one of the categories proposed by Nelson Goodman (1976). Film is not really autographic like painting, although it can be argued that there are films that have been painted upon in an autographic manner (think of early hand-colored films or avant-garde animation films by Oskar Fischinger or Norman McLaren), but it is also not really allographic like music, although every new projection of the same film is undeniably a different performance in terms of versions, musical accompaniment for silent films, and settings.
Refer to the FIAF website for the integral text: http://www.fiafnet.org/uk/members/ethics.cfm

See Chapters Three and Four for a discussion of the field and of a number of case studies.

Collection and selection policies have been briefly treated in the Introduction and will be discussed later in relation to the archives treated in Chapter Three. On the important issue of selection, see also Uricchio’s article “Archives and Absences” (1995). Various forms of film exhibition practices within film archives and their influence on audiences’ ideas on film have been recently discussed in detail by Lameris (2007: 153-232).

For a discussion on the truthfulness of photographic as compared to digital reproduction, refer to Mitchell (1982), Manovich (2001) and Kessler (2009).

Note that Bazin’s theory, from this perspective, is not one that should be ignored, but that should be understood in a context other than its relationship with Peirce’s indexicality. In this vein, Gunning rightly points out that “the index might not supply a complete understanding of Bazin’s theory of cinematic realism” and that “his theory of cinematic realism depends on a more complex (and less logical) process of spectator involvement.” (2007-I: 33) With respect to the discussion on photographic indexicality, refer also to Gunning, 2004-I.


In Rodowick’s view, the sort of movement created by a film projection is ontologically different than the movement created by a digital projection as the latter “corresponds less to the duration and movements of the world than to the control and variation of discrete numerical elements internal to the computer’s memory and logical processes.” (2007: 166).

Apart from examples of color differences in silent films (Cherchi Usai, 1991 and 2000; Fossati, 1996 and 1998), it is interesting that the recent example of the Coen brothers’ black and white film, The Man Who Wasn’t There (USA, 2001), was printed on black and white film stock for the US distribution and on color stock for the European distribution – see interviews with Roger Deakins, Director of Photography of the film: http://www.cameraguild.com/interviews/chat_deakins/deakins_transcript.htm and http://www.cameraguild.com/magazine/stoo1101b.htm.

In this vein, Crary writes: “The formalization and diffusion of computer generated imagery heralds the ubiquitous implantation of fabricated visual “spaces” radically different from the mimetic capacities of film, photography, and television.” (1990: 1) Manovich offers quite an extreme view in this direction: “Cinema is the art of the index; it is an attempt to make art out of a footprint. […] As cinema enters the digital age, these techniques are again becoming commonplace in the filmmaking process. Consequently, cinema can no longer be clearly dis-
tinguished from animation. It is no longer an indexical media technology but, rather, a subgenre of painting.” (2001: 295).

Note that the recognition of the importance of preserving original film elements as long as possible even after they have been duplicated onto new film stock, is unfortunately relatively recent. See in this regard, Meyer (2001), Nissen et al. (2002) and Enticknap (2005).

Interestingly, long before the **politique des auteurs**, a film archivist like Iris Barry, founder of the film library at the MoMA and its first film Curator, considered Hitchcock an expert on “the art of film” as she invited him to lecture on the subject when he moved to the USA in 1939 (Bordwell, 1997: 24-27 and http://www.moma.org/exhibitions/1999/hitchcock/curator_essay1.html).

Frank Kessler explains why the French word *dispositif* is more appropriate than the English translation *apparatus*: “The usual English translation of *dispositif* by ‘apparatus’ poses a twofold problem: first of all it does not render the idea of a specific arrangement or tendency (*disposition*), which the French term implies, and secondly, it makes it difficult to distinguish between two concepts in Baudry’s theory, namely the ‘*dispositif*’ on the one hand, and the ‘*appareil de base*’ on the other.” (2006: 60).


Refer to http://en.wikipedia.org/wiki/Videotape_format_war for more information on the videotape format war in the 1980s.


It should be noted once again that Rodowick, when discussing the ontological issue leans towards an essential difference between the analog and the digital. In Gunning’s words: “Rodowick admits that digital images can (and usually do) resemble traditional chemical photography, but he maintains that transforming images of the world into a matrix of numbers absolutely changes their relation to time, the world and the viewer” (2007-II: 78).

“[… ] photography can by no means be assumed to be the sole pre-condition for a moving image medium, and if we go so far as to drop it as a necessary and defining condition, we might begin to ask very different questions about the cultural space film entered. For example, what if the film medium had in fact entered a space prepared for television?” (Uricchio, 2002-I: 114).
“The two separate historical trajectories finally meet. Media and computer – Daguerre’s daguerreotype and Babbage’s Analytical Engine, the Lumière’s Cinématographe and Hollerith’s tabulator – merge into one. All existing media are translated into numerical data accessible for the computer. The result: graphics, moving images, sounds, shapes, and texts become computable, that is, simply sets of computer data. In short, media become new media” (Manovich, 2001: 25).

For instance, in the case of the restoration of Carl Th. Dreyer’s film Der Var Engang / Once Upon a Time (Denmark, 1922), carried out by the Danish Film Institute in 1992, stills and texts have been added where scenes were missing. Also, for a trained eye, digital enhancements in the restoration of a silent film, e.g. deflickering and rock steady stabilization, can be experienced as hypermediacy.


In contrast to Actor-Network-Theory, SCOT does not attribute agency to technology and artifacts but rather looks at them as social processes avoiding the risk of lending technology an autonomous life of its own (Bijker, 1995: 49). Furthermore, SCOT, by looking at social groups rather than individual actors (Bijker, 1995: 192), like other theories do, offers a more relevant model for the archival field where archives, funding entities and laboratories have, in my opinion, a stronger influence than individuals. However, SCOT acknowledges also the role of individual actors, as I will do in analyzing the film archival field.

In this regard, Bijker states that: “Actors with a high degree of inclusion are more to the inside than actors with a lower degree of inclusion” (1995: 282).

The seminar “The Reel Thing” and the AMIA panel discussion took place at the Nederlands Filmmuseum in Amsterdam on 11 April, 2007, the opening day of the Filmmuseum Biennale. The morning program was led by the organizers of the symposium “The Reel Thing” at its 18th edition, Grover Crisp and Michael Friend. The symposium regularly offers an overview of the most recent technologies in the field of film restoration and preservation. The afternoon program, organised by the Association of Moving Image Archivists (AMIA), dealt with the developments in archiving moving images and formed an important international platform for individuals concerned with preserving and utilising archival films.

Although I am not going into each of the five requirements Bijker points out for technological frames, note that they are to: “(1) be able to account for change in technology, (2) be able to explain consistency and lack of change in history, (3) be symmetrical with respect to success and failure, (4) encompass actors’ strategies as well as structural constraints, and (5) avoid their implicit a priori assumption of various distinctions made by the actors themselves” (Bijker, 1995: 191).

Refer to the discussion on digital cinema in Chapter One.

If not for other reasons, this would be true because of the much broader scope of different relevant social groups that interact around film compared to those interacting around the bicycle.
Refer to Fossati, 1995 and 1998 for more on this subject and a discussion of the reason why color in early film risked being erased from film history.

It should be pointed out that in Bijker’s theory, the “working” of a machine “is not an intrinsic property of the artifact, explaining its success; rather, it should figure as a result of the machine’s success. Thus the success or failure of an artifact are to be explained symmetrically, by the same conceptual framework. An asymmetric explanation might, for example, explain the commercial success of an artifact that we now consider to be working by referring to that ‘working’, while the failure of that same artifact in another context might be explained by pointing at social factors” (Bijker, 1995: 14-15).

With regard to the definition of “critical museum”, Horwath states that the “museum is a critical, ethical, and political tool, which stands in direct opposition to whatever social mood or climate or ideology is hegemonic at a given time” (2005: 7).

Just to name a few Selznick graduates currently active in the field: Simona Monizza and Catherine Cormon at the Nederlands Filmmuseum, Annette Groschke at the Deutsche Kinemathek, Rita Belda at Sony Pictures Entertainment, Andrew Lampert at Anthology Film Archives, Giovanni Schiano Lomoriello at Imperial War Museum, Diana Little at Cineric Laboratories, Mark Toscano at Academy Film Archive.

Cherchi Usai justifies his decision to destroy the negative by saying that: “I like to treat my film as a biological entity. The prints have been deposited, donated or bequested to archives and museums around the world, with the legally stipulated proviso that the film will not be reproduced in any form nor projected with a recorded soundtrack.” In the same interview, Cherchi Usai also points out that the seven black-and-white prints of Passio were all separately tinted following a technique similar to the one used in the silent era: “Each print has a specific dominant hue, and the brushstrokes were applied to different shots in each print, based on the correspondence between colours and images in the film. As a result, the seven prints are very different from each other. Only the last shot was hand-coloured in all the seven prints.” – Grant McDonald, “Passio. An Interview with Paolo Cherchi Usai”: http://www.rouge.com.au/10/passio.html

The Danish Film Institute’s activities extend further than the film archive and the so-called Cinémathèque, where films are shown to the general public in Copenhagen. The Institute also participates in the development and production of feature films, shorts and documentary films, as well as their distribution and marketing.

Note that the Danish Film Institute regularly receives new film elements for every new film that is produced in Denmark. This is the consequence of the so-called legal deposit system in place in several countries, including Germany, France, Italy and the United States of America. For an in-depth discussion of such a system, refer to Gorini, 2004.
Dan Nissen, Director of the Danish Film Archive, announced that: “The Danish Film Institute’s collection of Danish and international films — from Dreyer’s immortal masterpieces to Griffith’s seminal ‘Intolerance’ and rare documentary footage from times long past — are securely ensconced in a 1,160 m2 underground refrigerator. The sole sign above ground is something resembling a cemetery of sarcophagi or an enigmatic modern landscape installation.” See http://www.dfi.dk/english/News/newnitratearchiveopens.html

Note that the Nederlands Filmmuseum is also considering this option for its new storage facilities, but only for the historical acetate collection and, in particular, for the original negatives and the fine grains that can be used as sources for future duplications.

Thomas Christensen, e-mail message to author, May 14, 2008.

Interestingly, the current Dutch Minister of Culture, Ronald Plasterk, is actively promoting the creation of such an organ that would group many of the small Dutch film organizations together with the Nederlands Filmmuseum and the Dutch Fund for Films.

Thomas Christensen, e-mail message to author, May 14, 2008.

Recently, the Nederlands Filmmuseum has carried out an important project with the goal of acquiring, preserving and restoring Dutch experimental films from the period 1960-2000. A number of filmmakers actively cooperated with film restorer Simona Monizza, who led the restoration efforts. Refer also to two DVDs resulting from this project and containing reports on the filmmakers’ involvement in the work: Barbara Meter – PureFilm (Amsterdam: Nederlands Filmmuseum, 2008) and Frans Zwartjes – The Great Cinema Magician (Amsterdam: Nederlands Filmmuseum, 2007). See also the website created as part of the project: http://experimentele.filminnederland.nl/


Filmmaker Jerome Hill was instrumental to the creation of Anthology, not only as one of the inspirations but also as the person who made it financially possible. Among his many philanthropic contributions to artists and avant-garde filmmakers, Jerome Hill funded the realization of Anthology’s original screening room designed by Peter Kubelka, known as the Invisible Cinema, and funded the acquisition of film prints of the Essential Cinema Repertory collection (Haller, 2005).

See the Anthology Film Archives’ Manifesto at http://www.anthologyfilmarchives.org/history/manifesto/ (accessed May 13, 2008).

The definition “Orphan film” has gained particular relevancy over the last few years thanks to, among others, The Orphan Film Symposium, founded and organized by Dan Streible, at its sixth edition in 2008. According to the Symposium’s website, an Orphan film is “a motion picture abandoned by its owner or caretaker. More generally, the term refers to all manner of films outside of the commercial mainstream: public domain materials, home movies, outtakes, unreleased films, industrial and educational movies, independent documentaries, ethnographic films, newsreels, censored material, underground works, experimental pieces, silent-era productions, stock footage, found footage, medical films, kinescopes, small- and unusual-gauge films, amateur productions, surveillance footage, test reels, government films, advertisements, sponsored films, student works, and sundry other ephemeral pieces of celluloid (or paper or glass or tape or . . . ).” See http://www.sc.edu/filmsymposium/orphanfilm.html (accessed May 16, 2008).


Refer to the Anthology Film Archives April-June, 2008 Program.

This and following quotes are based on conversations and correspondence with Andrew Lampert, in particular a meeting on 5 March, 2008 at Anthology in New York and a telephone interview on 21 May, 2008.

This restoration project was supervised for Anthology by independent film Curator, Bruce Posner, and carried out at Cineric.

Andrew Lampert, telephone interview by author, May 21, 2008.

Although Third World film heritage falls outside the scope of this work, it is worth mentioning that outside Western Europe, North America and Japan, most of the remaining audiovisual heritage can be considered Orphan. From this perspective, it is again through digital means that audiovisual content can gain a world-wide visibility: not only world-wide in the sense that Western films can be seen everywhere, but also that non-Western films can be seen for the first time.

Andrew Lampert, telephone interview by author, May 21, 2008.


Andrew Lampert, telephone interview by author, May 21, 2008.


Refer to Lampert, 2006.

For a detailed background history of the Nederlands Filmmuseum, refer to those who have done detailed research, in particular Hendriks, 1996 and Lameris, 2007.

Both collections have been studied and discussed in many articles and books. The Desmet collection contains most of the international films shown in the Netherlands between 1907 and 1916 by cinema owner and distributor Jean Desmet (see Blom, 2003 and Lameris, 2007: 29-34). The Uitkijk collection contains
the distribution films shown and distributed in the Netherlands by the Dutch early film club Filmliga, which between 1927 and 1933 brought to the Dutch cinéphiles some of the most important titles of the European avant-garde (see de Klerk and Visschedijk, 1999 and Lameris, 2007: 34-38).

171 About Bits & Pieces, see Delpeut, 1990 and Verhoeff, 2002 and 2006: 25-43; about non-fictional films, see Hertogs and De Klerk, 1994 and 1997, and, in particular, Peterson, 1997; about color, see Hertogs and De Klerk, 1996.

172 The project involved transfer at Standard Definition to Digital Betacam tapes and encoding to MPEG1 files.


175 Refer with this regard to phenomena like “social tagging” mentioned earlier in Chapter One and discussed, among others, by De Jong (2005) and Uricchio (2007).

176 For more background information on Images for the Future, refer to the official website: http://www.imagesforthefuture.org/

177 Note that at the time of writing three providers have been granted the preservation and digitization tasks by the Filmmuseum for the next two years. The Dutch laboratory, Haghefilm, and the New York-based Cineric have won the tender for film-to-film preservation, while the American company Thought Equity Motion – www.thoughtequity.com, specializing in digitization and asset management, has won the tender for digitization.

178 To quote Emjay Rechsteiner, Project Manager of Images for the Future for the Filmmuseum: “Today programmers decide which film you can see in our theaters and when, within a couple of years the consumer himself will decide what to see and when: the audience becomes the programmer.” (André Waardenburg, “Publiek wordt zelf programmeur,” *NRC Handelsblad*, January 11, 2008 – my translation).

179 Exceptions are those non-profit archives that benefit from a national legal deposit legislation, as in the case of the Danish Film Institute. Still, also in this case, the relation with the industry (i.e. film producers) is quite different from that of film studios’ archives.

180 Grover Crisp, e-mail message to author, May 27, 2008.

181 Interesting in this regard is a plea by filmmaker Jon Jost to FIAF, cited by Cherchi Usai, to take over the production of a few basic stocks of photochemical film (Jost, 2001, also cited in Cherchi Usai, 2002: 36-37).

182 Much of the information on Sony’s work reported here derives from conversations with Grover Crisp and his interventions at the AMIA seminar (Amsterdam, 2007) mentioned earlier. Also refer to Sony’s website dedicated to preservation: http://www.sonypicturesmuseum.com/film_preservation/preservation.html

This project will be discussed in detail in the next chapter. Note that Crisp has presented this restoration at several events, including the Joint Technical Symposium in Toronto and “The Reel Thing” in Amsterdam, both held in 2007, offering the first opportunity to discuss the use of the digital at such high resolution and showing how a digital projection of the results compares to a traditional film projection.

Refer also to Chapter One where ViiA was briefly discussed.

For details on LTO tapes, refer to http://en.wikipedia.org/wiki/Linear_Tape-Open

See Prasad’s website, http://www.efxmagic.com/restore/. One very important project Prasad has recently carried out is the digital restoration commissioned by Warner Bros. of the Cinerama title, How the West Was Won (USA, 1962). Also laboratories such as Cineric regularly outsource dust removal work to Prasad because of the highly competitive costs of manual labor. At the time of writing, the Nederlands Filmmuseum has outsourced some digital “dustbusting” work to Prasad. In this case, Nederlands Filmmuseum restorer, Annike Kross, has set the standards for the work to be carried out at the Indian laboratory.

Refer to the definition of frameworks and concepts and their distinctions in Chapter Two.

The discussion on Haghefilm laboratory benefits from twelve years of close collaboration with this laboratory and its exceptional staff. As Curator at the Nederlands Filmmuseum and supervisor of many restoration projects, most of which were carried out in collaboration with Haghefilm, I regularly spend several hours every week at Haghefilm’s facilities discussing restoration-related issues. I would also like to point out an article that quite uniquely discusses the work carried out by Haghefilm: The Finesse of the Film Lab. A Report from a Week at Haghefilm by Gabriel M. Paletz (2006).

For a discussion on color in silent films and the restoration approach towards such colors throughout the years, refer to Hertogs and De Klerk, 1996, Fossati, 1996 and 1998.

Especially since 1999, when the Nederlands Filmmuseum created a Film Restoration Department, led by me until 2002, the focus on restoration quality has been particularly strong and it has been translated into an intensified dialogue with Haghefilm technicians, through weekly meetings and thematic workshops (refer to Paletz, 2006: 14). It should, however, be noted that quality was central even in the period before, but it also had to be paired with the need for a high production, namely, more meters of film to be restored per week.

The rostrum camera is "a specially adapted camera used in television and film to animate a still picture or object. It consists of a moving lower platform on which the article to be filmed is placed, while the camera is placed above on a column. The camera is connected to a mechanism that allows an operator to precisely control the movement of the platform as well as of the camera." Wikipedia, http://en.wikipedia.org/wiki/Rostrum_camera (accessed July 16, 2008).

Within the Dutch Experimental films project, some remarkable results have been obtained through digital restoration from original 16mm color reversal films, where analog duplication could not accurately reproduce the colors and contrast typical of such film material widely used in the 1970s and 1980s. One such case has been that of Tarting Over (Netherlands, 1981), shot on Kodachrome Color Reversal stock by Dutch experimental filmmaker, Paul de Nooijer.

Refer to Chapter One for a detailed discussion of the digital intermediate process. See also Glossary.


Paul Read, e-mail message to author, May 26, 2008.

Refer to Chapter One and to the Glossary for a technical description of such processes, including a discussion on resolution and color depth values.

Much information contained in this study derives from interviews that I carried out with a number of staff members at Cineric in March, 2008. In particular, conversations with Balázs Nyari, President, Tom Heitman, Director of Preservation and Restoration, Simon Lund, Technical Director, Daniel DeVincent, Director of Digital Restoration, and Seth Berkowitz, Digital Repair, have been very useful.

Refer to Chapter One for a discussion on the digitization of optical special effects and digital compositing.


As mentioned earlier, it should be noted that this technique has already become obsolete as digital tools can today reach better results in the restoration of color-faded films.

Tom Heitman, e-mail message to author, January 8, 2009.

A very informative documentary on this restoration, Restoring CinemaScope 55 The King and I (USA, 2004), made by filmmaker and Cineric Technical Director, Simon Lund, can be viewed on-line on the useful Video Aids for Film Preservation website at http://www.folkstreams.net/vafp/clip.php?id=42. This restoration was supervised by Schawn Belston, Vice President of Library and Technical Services at Twentieth Century Fox.

The first animation film restored entirely using digital tools is Disney’s *Snow White and the Seven Dwarfs* (USA, 1937). Although animation is considered outside the scope of this work, this restoration (carried out in 1993), has been briefly discussed in Chapter One.

Sony Pictures High Definition Center (SPHDC) “[...] was set-up circa 1990 at the studio lot in Culver City initially as an R&D [research and development] facility related to the digital HD format that Sony was working on at that time. This was the 1035i format using 1” digital HD tape. Although designed for R&D, it eventually became primarily a telecine facility for Sony Pictures as well as a few outside clients, to do film-to-HD transfers. Additionally, engineers in the SPHDC worked with us to develop processes to use for restoration, some manual and some automated. [...] Other projects there involved the scanning and re-registration digitally of separation masters [BLACK-AND-WHITE SEPARATION MASTERS] to record to a new negative (*Easy Rider* – USA, 1969- in 1996-1997), as well as other projects of a similar nature. The facility closed its operation in February of 2002.” (Grover Crisp, e-mail message to author, May 27, 2008).

Grover Crisp, e-mail message to author, May 27, 2008. Note also that the innovative work of many people made the digital restoration of *The Matinee Idol* possible. In most cases the software needed for the job was developed or modified on the spot. In addition, the collaboration with the Cinémathèque Française has been instrumental to the successful result of the project. To the question of why a new intermediate positive was digitized and not the surviving print found at Cinémathèque Française, Grover Crisp notes that “At the time, there was a lot of discussion about scanning from original negative or from protection elements. We opted for scanning the protection (the Interpositive made from the Duplicate Negative) primarily on the assumption we were providing additional ‘protection’ against possible further damage to the negative. The top scanners at the time were pin-registered and the work was new and we were not anxious to take chanc-
es with original negative. That ethic has completely changed now, some twelve years later. In planning a digital restoration we always look to scan the most original source if possible.” (Grover Crisp, e-mail message to the author, January 22, 2008).

222 It should be added that Grover Crisp, in a later e-mail message to the author (January 22, 2008) pointed out that very recently tests have clearly shown “that to scan any 35mm film element at less than 4K is to lose image information. Good, faster 4K scanners are more readily available. Also, in this short amount of time, the cost of 4K scanning has come down to more affordable rates.” One more indication of how rapidly the technological frame is changing and how profoundly transitional today’s practice is.

223 Michael Friend, e-mail message to author, August 20, 2008.

224 Interestingly, this was at first the only intervention that was meant to be carried out, as Friend recounts: “When we began Matinee Idol, we really thought we would just replace the French titles with English titles.” (Michael Friend, e-mail message to author, August 20, 2008).

225 Michael Friend, e-mail message to author, August 20, 2008.

226 Michael Friend, e-mail message to author, August 20, 2008.

227 Whereas the shift from a theatrical exhibition to a DVD is clear enough in terms of changing dispositif, one could argue that the shift from a silent film projection with live music accompaniment to a film projection of the same silent film with a soundtrack optically recorded on the film print does not offer sufficient grounds to claim a different dispositif. In Chapter Two I have argued that the configuration of a new dispositif depends more on the viewer rather than on the setting. Indeed, a viewer who is not aware of the different apparatus will not perceive the shift in dispositif, whereas a viewer who is aware will. The same line of reasoning applies for a film-born film when projected digitally.

228 The discussion of this project is based on information originating from various sources, such as interviews and correspondence with Grover Crisp, Senior Vice President of Asset Management and Film Restoration at Sony Pictures, Daniel DeVincent, Director of Digital Restoration at Cineric Laboratory as well as presentations given by them at The Reel Thing XVIII (Amsterdam, April 11, 2007 – Grover Crisp) and at the Joint Technical Symposium 2007 (Toronto, June 28-30 2007 – Daniel DeVincent).

229 Grover Crisp, e-mail message to author, May 27, 2008.

The recent publication of an article promoting archival concerns in this matter, might suggest that the issues of obsolete projection speeds and of the aspect ratios might still be considered by the SMPTE standard commission for digital cinema (Nowak and Fössel, 2008).


Note that, as discussed in Chapter Two with regard to the “film as art” framework, the relationship between the restorer and the filmmaker/auteur can be a difficult one, as filmmakers are not necessarily the most reliable sources for a faithful restoration of the film as it originally was. For instance, filmmakers would sometimes like to “improve” their films during the restoration process because their view about the film has changed since it was completed.

This record of the restoration of Mahagonny is based on interviews and correspondence with some of the people involved, including Simon Lund (interviews 3-5 March, 2008), Andrew Lampert (21 June, 2008) and e-mail correspondence with Rani Singh (12 August, 2008). In addition, the entertaining short film made by Simon Lund, Restoring Harry Smith’s Mahagonny (USA, 2002), has been a very useful source of information. Lund’s film can be viewed on http://www.folkstreams.net/vafp/clip.php?id=5

In this regard Friend quite eloquently states that: “I would say that the only performative aspect of this work that has meaning is the performance of Harry Smith.” (Michael Friend, e-mail message to author, August 20, 2008).

Andrew Lampert, telephone interview by author, May 21, 2008.
According to the Nederlands Filmmuseum’s website “director Kleinman stated: ‘The concept known as the soundie is, in this case, limited to some songs and people should not expect complete dialogues.’ It is for this reason that he cast two professional singers in the leading parts. The sound was meant to be recorded and played on gramophone records were it not that Kleinman had underestimated the complications surrounding sound technology. Hence the film became the last silent Dutch film.”: http://lisa.filmmuseum.nl/biennale03/html/index-234.html

Internal report by Paul Read to the Nederlands Filmmuseum (April 2003). Note that a few title cards were removed from the sound version as they had become redundant by the addition of dialogues.

Internal report by Paul Read to the Nederlands Filmmuseum (April 2003).

For an exhaustive background story of the Parisien theater and its use by the Nederlands Filmmuseum throughout the years, refer to Lameris, 2007: 114-116.

From January to March 2005 I spent most of my waking hours in front of two computer monitors with the goal of digitally restoring about one half of the film. The other half was outsourced to Haghefilm where Paulo Fonseca, Digital Restoration Artist, did the work in close contact with me to make sure that we would end up with matching results.

Refer to the second part of Chapter One for a complete overview of the technical tools available today for digital restoration and their technical descriptions.

Refer to Chapter One for a description of this method.

It should be pointed out that Beyond the Rocks was shown as a digital projection in the framework of the Cinema Net Europe (http://www.cinemaneteurope.com/), discussed in Chapter One, which at the time employed only so-called E-Cinema projectors with a resolution of 1,4K, thus lower than the 2K standard for digital cinema projection, as indicated by DCI and SMPTE.

It should be noted that this is not the only case, as Warner Bros. has also released restorations in digital cinema format. Examples are Casablanca (USA, 1942) and Gone with the Wind (USA, 1939).

This idea is central to Jacques Derrida’s discussion of archives (1995) and it has been articulated with regard to film archives in the earlier mentioned article by William Uricchio, “Archives and Absences” (1995).