anamorphic Hypergonar lens, Fox engineers viewed it as the basis for a spectacular widescreen system that, like 50mm film, was essentially compatible with existing 35mm theater projection equipment and that could generate an image of near-Cinerama proportions with an (initial) aspect ratio of 2.66:1.

A study of Fox's experiments with 50mm reveals that technological development takes place within a complex field of events, activities, strategies, ideological assumptions, and marketplace forces that interact with one another in chaotic and unpredictable ways. The story of 50mm illustrates an attempt to guide a particular technology through this minefield of conflicting forces and infinite possibilities. 50mm never made it, but it left its mark: the development of CinemaScope takes the specific shape that it does in consequence of lessons learned with 50mm film.

Notes

1. "Committee Activities: Report of the Standards and Nomen clature Committee," *Journal of the Society of Motion Picture Engineers* 17.3 (1931): 431.

2. Herbert Bragg to A. J. Hallock, 7 Aug. 1931, "50mm" folder, box 8, Sponable Papers, Columbia University Libraries.

3. Memo, Sponable to Harley L. Clarke, 11 June 1931, "50mm" folder, box 8, Sponable Papers.

4. Unsigned memo, 2 Feb. 1945, "50mm" folder, box 8, Sponable Papers.

5. Ray Klune to Sponable, 3 Dec. 1945, 13 Mar. 1946, "50mm" folder, box 8, Sponable Papers.

6. John Lividary to Sponable, 29 June 1946, "50mm" folder, box 8, Sponable Papers.

7. Memo, Sponable to Otto Koegel, 31 May 1956, "History" folder, box 97, Sponable Papers.

8. Memo, Sponable Otto Koegel, 31 May 1956, "History" folder, box 97, Sponable Papers.

9. Memo, Sponable to Otto Koegel, 31 May 1956, "History" folder, box 97, Sponable Papers.

Nitrate's Still Waiting

Leo Enticknap

If it is a "common assumption of historical scholarship that history is written by, about, or for the winners," then where does this leave a technology that has both won and lost? To its supporters cellulose nitrate film was the substance that made cinema possible in the first place, that enables an aesthetic quality of the photographic image unmatched by any other film support, and that, if stored in ideal environmental conditions, will preserve its contents almost indefinitely. Paolo Cherchi Usai, for example, characterizes the projection of a nitrate print as "razor sharp exteriors, the gauzed close-ups, the ravishing use of tints and tones and the sheer depth of the image."[1] To its detractors nitrate is a difficult and expensive fire hazard that, if not stored in ideal environmental conditions, will destroy itself in a few short decades. As a former curator of film at the Library of Congress put it, "There's an end point the stuff just goes."[2]

The invention of nitrate represented a holy grail, the end of a long and tortuous road that had begun in the middle of the nineteenth century. The pioneers of Victorian optical media realized that in order to reproduce the illusion of continuous movement in a sequence of photographic images, a support for the photosensitive emulsion was needed that was flexible, transparent, and tough enough to withstand intense heat and intermittent movement. The alternatives, principally paper and glass slides projected in rapid succession, had proven not up to the job. When in 1889 the Eastman Dry Plate Company supplied its first roll of coated celluloid base, nitrate was very much a success story. Its flammability was considered a minor inconvenience, and at that stage no one was worrying about preservation.

This verdict persisted, largely unchallenged, until after the Second World War. While film bases less flammable than nitrate, principally diacetate and butyrate, were developed and marketed for amateur cinematography and other niche applications, their lower tensile strength and higher cost caused them to be rejected by the professional film industry. At the SMPE conference in 1948 Eastman Kodak changed all that at a stroke. Possibly utilizing the results of research and development captured from the Nazis, an "improved" acetate base film was launched.[3] Not only that, Kodak announced plans to immediately phase out the manufacture of nitrate.[4]

At around the same time, archivists were discovering that nitrate decomposed. The earliest documented description of the five-stage decomposition process was by the British preservation pioneer Harold Brown in the mid-1940s. But at that stage the underlying cause and, crucially, the fact that all cellulose esters decompose in a very similar fashion, regardless of whether nitric or acetic acid is used to dissolve the wood pulp—was not known, and so the new acetate film was considered a savior on two scores. Not only was cellulose triacetate a "safety" film in the sense that it was

no more inflammable than paper, but it was also believed to be immune from the decomposition process that the world's nascent moving image archives were rapidly having to face.

Nitrate, therefore, went from being a technological success story to a moribund and dangerous failure within the space of a few short years. Between the 1950s and 1970s its use for exhibition was banned in all but a few arthouse projection booths, which by legal decree had to be equipped with far more elaborate safety precautions than most had had when nitrate was in mainstream use. The studios and public archives adopted the policy epitomized by the title of Anthony Slide's history of the American film archiving movement, *Nitrate Won't Wait*. The former made crude 16mm optical reduction prints of many of their features and then destroyed the original elements in the belief that their only future value lay in TV licensing. The latter adopted a "copy to preserve as quickly as possible" approach as well, leaving, in many cases, a legacy of poor quality preservation elements.

Then in the mid 1980s the tables turned on nitrate once again. Research carried out by the Image Permanence Institute in New York and Manchester Metropolitan Uni versity in the UK established two important discoveries. The first was that, when stored in a cool and very low humidity environment, the process of nitrate decomposition could be retarded almost to the point of being arrested: the film's lifetime could now be measured in centuries. The second was that acetate film decomposes as well (deacetylation, better known by the infamous nickname "vinegar syndrome") and is in many ways more difficult to store than nitrate. This was immediately followed by the emergence of new photochemical and later digital duplication technologies that revealed for the first time the full extent of the contrast, density, and detail captured on a typical 35mm nitrate negative. Although the health and safety issues haven't gone away, archivists and historians now generally regard nitrate elements as valuable cultural artefacts and the bedrock of any preservation strategy rather than unexploded bombs that must be neutralized and destroyed as quickly as possible.

This debate has polarized film archivists and historians of media technology in the last two decades. It has pro duced no consensus of historical opinion, unlike the debate around most other prominent and obsolete technologies, for which the criteria for success that have generally been applied are that a technology must have been in widespread use and for a long time. Even though they "worked" in a strict technical sense, the Eidophor (in use for a long time but only on a very small scale) and Dufaycolor (on a large scale but only for a short time) are generally regarded as failures and footnotes, while chromogenic dye-coupler color and VHS (in use constantly and worldwide for many decades) as successes and underpinning technologies for the moving image as mass culture. Nitrate film does not really fit into either of these categories, and even those who claim that it does are constantly revising their opinions on the matter. Nitrate is still waiting for history's verdict, and it'll be a long time coming.

Notes

1. Paolo Cherchi Usai, *Burning Passions: An Introduction to the Study of Silent Cinema* (London: British Film Institute, 1994), 2.

2. Interviewed in the documentary *Keepers of the Frame* (1999, dir. Mark McLaughlin).

3. Leo Enticknap, "The Film Industry's Conversion from Nitrate to Safety Stocks in the 1940s: A Discussion of the Reasons and Consequences," *This Film Is Dangerous: A Celebration of Nitrate Film*, ed. Roger Smither and Catherine Surowiec (Brussels: FIAF, 2002), 202–12.

4. Charles R. Fordyce, "Improved Safety Motion Picture Film Support," *Journal of the SMPE* 51 (October 1948): 331–50.

Plug and Pray: Performances of Risk and Failure in Digital Media Presentations

Lisa Nakamura

"Failure" has an exalted status in new and digital media culture. For years, digital technologists such as Steve Wozniak have proudly characterized projects such as the Macintosh Lisa, an early personal computer that found few buyers, as "failures" (or, even better, as "complete failures"). Such objects benefit from being described as failures because they then seem like examples of overreaching, products of their maker's excessive ambition and vision, whereas devices that sell well or perform reliably must be boring. Of course, characterizing an object as a failure is a much more successful strategy if it was an early iteration of one that later became extremely popular or admired. Media producers as well as media critics and scholars create genealogies of development that emphasize the false start or flop but to different ends. What is neglected in these discussions is the role of failure in individual new