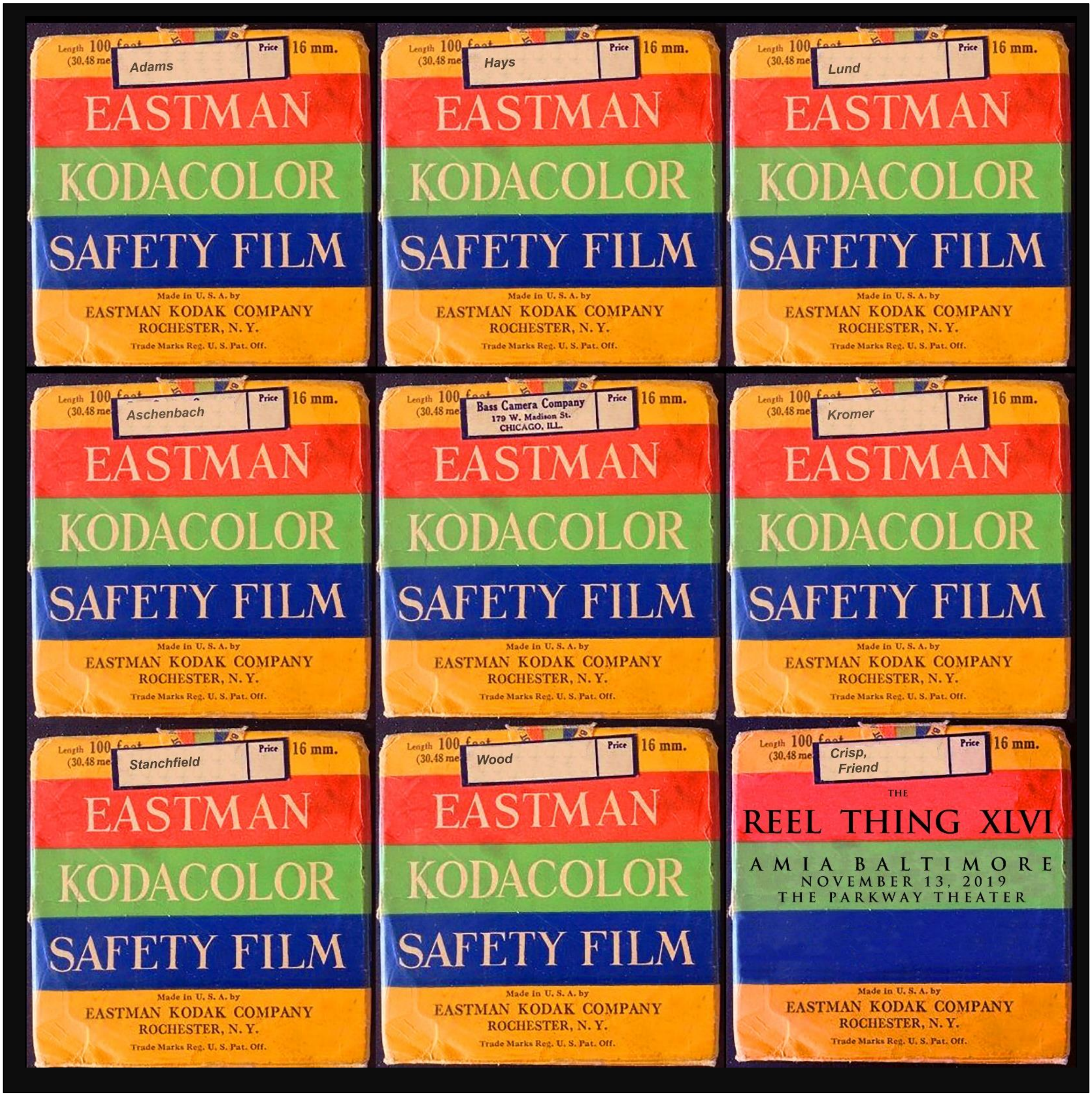
Length 100 feet
(30.48 meters)
Adams
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16 mm.
EASTMAN
KODACOLOR
SAFETY FILM
Made in U. S. A. by
EASTMAN KODAK COMPANY
ROCHESTER, N. Y.
Trade Marks Reg. U. S. Pat. Off.
Hays
Lund
Aschenbach
Bass Camera Company
179 W. Madison St.
CHICAGO, ILL.
Kromer
Stanchfield
Wood
Crisp,
Friend
THE
REEL THING XLVI
AMIA BALTIMORE
NOVEMBER 13, 2019
THE PARKWAY THEATER

No enterprise in the non-profit world can accomplish much without the enlightened, altruistic cooperation of its benefactors. The Reel Thing has been privileged to enjoy the generous support of the professional community since its inception. The organizers of The Reel Thing would like to recognize and thank all the individuals and organizations who contributed their considerable skills, energy and enthusiasm to the symposium. As always, we thank our presenters, who share their knowledge and experience in this symposium. And we would like to recognize the following individuals for their support and collaboration:

Laura Rooney, Kristina Kersels, Beverly Graham
Kimberlee Granholm and Gary Adams

Evan Rogers and the staff of the Parkway Theater

The Reel Thing is made possible by the active and engaged support of some of the most important and innovative institutions in the archival field. These firms work side by side with scholars, archivists and asset managers to compile and disseminate information critical to the archival mission, raise the standard of preservation and restoration, and to find new ways to ensure that moving images from public collections and the private sector will retain their quality and remain accessible as a resource for future generations. We offer our gratitude for their indispensable support of The Reel Thing.

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Boston Light and Sound   The Boston Connection, Inc.   Colorlab   Digital Library Federation
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THE
R E E L T H I N G XLVI

The Parkway Theater, Baltimore Maryland
Wednesday, November 13, 2019

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Extracting Color from Kodacolor Lenticular Film
Simon Lund, Cineric

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From the Sensor to the File
Reto Kromer, Reto.ch

☯

The Bayer Necessities: Color Sampling Recipes
Tommy Aschenbach, Colorlab

☯

BREAK

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The Sound of War
Adrian Wood, Restorationist and Simon Lund, Cineric, Inc.

☯

Cartoon Care: Preserving 30s and 40s Animated Films in the Digital Age
Steve Stanchfield, College for Creative Studies and Thunderbean Animation

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Implementing Fixity in Google Cloud
Buzz Hays, Google

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Extracting Color from Kodacolor Lenticular Film

Simon Lund, Cineric

Whether working with analogue or digital tools, the recovery of color from a Kodacolor film presents unique difficulties. With Kodacolor, the record of color is captured in tiny lenticular lenses, and separation of the primaries is effected by filters. The process was limited in the amount of light that the lenses could capture, and the 'color space' of the image does not necessarily correspond to modern film emulsions or digital devices. This presentation will discuss two options for recovering lenticular color – one by recreating the original optics and scanning the film as an image projected through color filters, or scanning the film wet-gate, as a black-and-white image, and adding the color in post-processing. The values of these two paths will be explored.

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From the Sensor to the File

Reto Kromer, Reto.ch

What is the journey of the signals generated by a sensor to the data actually written into a file? This presentation focuses on the particularities of Bayer sensors. The vast majority of contemporary film scanners use Bayer sensors due to the many advantages they offer as capture devices at the inception of media workflows. This presentation addresses a method for using Bayer sensors to digitize at half resolution but full RGB. This scheme offers a way for archives with very limited funding to digitize economically but at high quality

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The Bayer Necessities: Color Sampling Recipes

Tommy Aschenbach, Colorlab

The capture and display of color information recording and display, which was a project since early cinema, has been a process of continuous technical evolution. Our understanding of chromatic and achromatic human visual acuity has been well defined. Some of the greatest motion pictures were able to tell their stories without color, but the introduction of color into any media project implies effective capture and control based on the intentions of the director and cinematographer. Preservation comes after the finalization of these projects, and requires an understanding of how images and their specific looks were created, and how they can be stored and calibrated in ways that will present the original aesthetic intentions of the creative source.

Single chip color utilizing a Bayer filter mosaic is commonplace in current original moving image acquisition. In film scanning, equal resolution sampling of red, green, and blue has been the preferable method of digitizing film as opposed to utilizing Bayer color sensing technology. As digital resolutions become larger and those resolutions compete and exceed the medium being scanned, the complexity of three-channel monochromatic sampling may no longer be required. Today, with the evolution of Bayer sensors and the corresponding workflow efficiencies they provide, it is worth a careful cost-benefit analysis in determining which technical path to take in image capture.

This presentation will explore physical constraints of the different color sampling technologies and the difference between luminance and color resolutions, in an attempt to determine at what resolution digitization of film using Bayer mosaic sensors is equal to or exceeds the technique of equal chromatic resolution sampling.

Comparisons between Bayer and non-Bayer film scanning will be shown using theoretical scenarios. In addition to mathematical analysis, examples of films scanned for this presentation on several commercial machines utilizing different methods for digitization of color information will be projected in order to provide a close comparison between Bayer color filter sensors and three-channel monochromatic systems.

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BREAK

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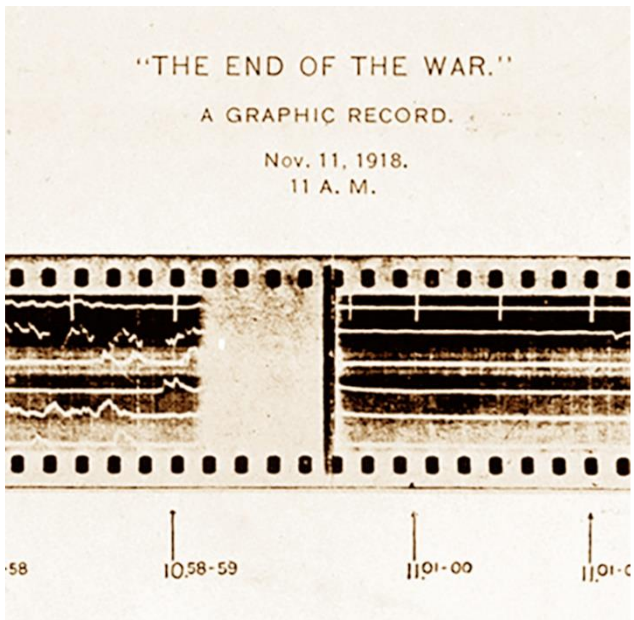


The Sound of War

Adrian Wood, Restorationist and Simon Lund, Cineric, Inc.

The frontispiece of the 1919 US Government Printing Office publication "America's Munitions 1917-1918 Report of Benedict Crowell (Assistant Secretary of War, Director of Munitions)" was an image that at a cursory glance might appear somewhat familiar to many of us. What the image above purported to show was a notated visual representation of the final moments of World War I at 11am on the 11th November, 101 years ago. The image was, however, two recordings crudely spliced together with a one minute gap in the time-line.

As part of their centennial commemorations last year to mark the end of the Great War, the Imperial War Museums in the UK collaborated with a sound design studio to turn this 'visual record' into an audio 'experience': codatocoda.bandcamp.com/album/iwm-ww1-armistice-interpretation

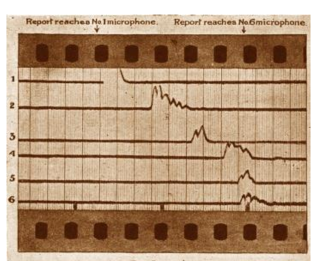
My curiosity was aroused and I began research into why the images were captured on what appeared to be 35mm film stock and whether there was any connection between this methodology of sound capture and the later experiments in optical soundtracks for film, albeit using variable density not variable area methods, by amongst others Theodore Case and Joseph Tykociner. This presentation will explain what was found or more importantly perhaps still remains to be found to tell the complete story of what has been described as the 'Manhattan Project' of the Great War.

Dublin-born Lucien Bull became the assistant of Etienne Jules Marey in 1895. Following Marey's death in 1904 Bull became Director of the Institut Marey in France. Bull had worked with Marey on the development of a device to capture 'chronophotographs', a camera to capture high-speed motion in a series of still images. These had been used to capture, amongst other things, the performance of athletes in Paris for the Olympic Games of 1900 and it was a series of 11 images of a seagull, captured in flight by Bull's cinematographic gun camera, that was used for the design of the then SMPE Progress Award Medal, when it was inaugurated in 1935.

In 1914 an astronomer from the Paris Observatory, serving with the French Artillery, approached Bull with his findings based on time differences measured between the sound of a gun's firing and the arrival of sound at fixed points with a stop watch, in an attempt to locate enemy artillery positions. Bull, an expert in low-frequency sound, adapted a three-string Einthoven galvanometer cardiograph device and then later produced a six-string version in which each string was connected to a microphone and each recorded a jump in a strong magnetic field when the sound arrived and the current in the string changed. The strings were strongly illuminated and their shadows thrown into juxtaposition across a slit. A sensitised film ran behind the slit, and a sprocket-drive wheel, governed by a tuning fork, interrupted the light 100 times a second, so ruling time markings across the film at each 1/100th of second. The apparatus was switched on and off by a forward observer, who heard the sound before it reached the microphones. When the recording ceased, an operator cut off the portion of film which had been exposed, developed and fixed it, and then passed it to 'the computer', who measured the time intervals and deduced the position of the gun emplacement. Bull submitted this concept in a 1915 paper simultaneously to the Société Géographique de l'Armée in Paris, and to the Sound Ranging Section of the War Office in London. One problem noted was the poor quality of the microphones in their ability to capture sound. Based on illustrations it would appear that film was being exposed at the rate of three 4-perf 35mm frames per two seconds, i.e. equivalent to 1.5fps.

In mid-1916 there was a breakthrough in Britain. Nobel Prize winner Lawrence Bragg and his team serving in France with the British Royal Artillery had solved many of the problems with Bull's system but, the serious inadequacy of the microphones remained. Bragg had noticed that, 'the gun report produced very little impression on the ear, but it was associated with a large pressure change; it rattled windows'. Furthermore, he had noticed that he was lifted a little off the toilet seat when a 6" gun fired, and others similarly felt a jet of cold air on their face through torn holes in their tent walls when they were lying on their camp beds.

When a Corporal William Tucker joined Bragg's team he provided the key to unlock the impasse. Tucker had been working in the Physics Department of Imperial College London on the variation of the electrical resistance of fine wires as a function of their temperature, and he now saw how to detect the high-pressure, very-low-frequency gun wave in his new 'Tucker Microphone'. This used a fine platinum wire, a disused ammunition box or rum jar, a variable resistor and a galvanometer string in the usual way. It was hoped that the burst of air associated with a gun firing would cool the wire, unbalance the circuit, cause the galvanometer string to jump, and produce a clear 'blip' on the film record.



Bragg recalled the first occasion, in June 1916, when it worked: ‘It was a wonderful moment, the answer to a prayer- it converted sound-ranging from a very doubtful proposition to a powerful practical method’ for the location of enemy artillery. The image above shows a clear record, where the start of each jump can be determined to better than one-hundredth of a second. It was also found in practice that six microphones provided ample data for correcting any errors. The number of sound-ranging sections along the front line was increased further and manufacture of the units was moved to from the Institut Marey to Cambridge Scientific Instruments in the UK given the large numbers of sets required for the entire Western Front.

In the US experiments only began on sound-ranging apparatus in June, 1917 (two months after the US had entered WWI) at two experimental stations under the Engineer Corps. Meanwhile the US American Expeditionary Forces (AEF) utilised the British 'Bull-Tucker' system which had met with great success.

Using plans and models sent to the US an 'American' Bull-Tucker machine was constructed with standard American electrical equipment wherever possible. A lab was set up at Princeton University where a special camera was designed to capture the sound image. The impulses received by the microphone in this equipment were recorded on a 'running tape' smoked by an acetylene flame.

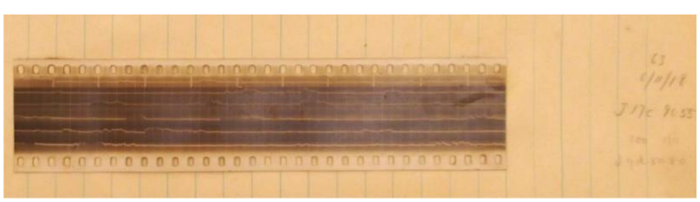
The number of locations which could be made in a given time depended upon the amount of firing on the front, but one section operating a single "Bull-Tucker" set located as many as 117 enemy guns in 24 hours. At the close of the war on the 60-mile front American front in France twelve complete American sets were in use.

A survey made by the AEF, after the end of hostilities, to determine German battery positions which had already been located by sound ranging devices, indicated that, while the individual locations in many cases were in error of between 20 to 60 meters, the mean of six or seven locations could be counted on for an accuracy of within 10 meters. The use of sound ranging had become very extensive before the fighting stopped. In May, 1917 Theodore Case was summoned to Washington DC for meetings with the US Signal Corps, in 1918 he was offered a Commission in the Navy Corps of Engineers which he declined but continued to work with signalling apparatus for use by the Navy. Whilst no papers have yet been located connecting Case to either Bragg or Tucker the Case Research Laboratory collection does contain three galvanometers of an unknown date.

In December 1919, William Henry Bragg, father of William Lawrence Bragg, gave a series of Christmas lectures at the Royal Institution in London. One included 'sound in war' that focused on his son's work in artillery sound-ranging as well as his own work on locating submarine activity with hydrophones and later sonar. A recording of his lectures as well as a recording of the actuality sounds acquired by hydrophones are within the un-digitised collection of the Royal Institution in London.

What does survive in private papers and on-line however are sound 'traces' that are clearly records on heavy paper with a sensitised coating. Was this surplus stock Bull acquired in Paris after the deposit of 'paper-prints' was no longer required in the US Library of Congress? So far evidence for this concept or why Bull chose perforated 35mm paper remains to be found.

It is not the first time I have raised with Simon Lund the question of whether he thought he could deliver something from a printed image. This time it was to recover sound from a pdf...



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Cartoon Care: Preserving 30s and 40s Animated Films in the Digital Age

Steve Stanchfield, College for Creative Studies and Thunderbean Animation

Animated shorts from the 1920s through the 1950s have often suffered the same kinds of abuse as their live action counterparts - from loss of original titles to missing scenes, misaligned color and ravages of time and neglect. While quite a bit of animation was produced and owned by studios, there were also a lot of independent studios, and many cartoon shorts originally distributed by the major studios reverted to original or successor owners. Animation pioneered many technical processes that are no longer supported by traditional laboratories or restoration workflows. Animation was often re-sold in packages for television or secondary markets, and these re-distribution agreements sometimes mandated re-cutting, retitling, and almost always the most economical and least comprehensive practices of remastering. As a result, animation restoration tends to present unique problem sets for the restoration archivists and their technical cohort.

In addition, because of the special nature of inked and painted drawings and single frame stop-motion photography, animation presents challenges for the digital restoration workflow, especially in the area of digital cleanup. This presentation will describe approaches to restoration using traditional as well as unconventional methods. Each project presents a series of choices that must be made in the wake of analysis of the available elements in order to achieve the desired outcome - for the restoration to be distributed as a digital product (a DCP, a Blu-ray, a master for streaming) or as a film that can circulate among archives and repertory cinemas.

Preparation techniques for film elements will be examined, using examples from several projects. Digital workflow pipelines and the role of processing methods (dust-busting, grain management, etc.) with special reference to the animated film will be covered, including short pipeline approaches to deflickering and image stabilization. The unique challenges associated with digital cleanup of early silent animated films and the special problem of cleanup methods for animation on 1's and 2's will be discussed. Other topics include techniques for addressing alignment issues with successive exposure Cinecolor animation, common challenges in color correction for IB Technicolor, Gasparcolor and other color formats. Since many animation subject are fragmentary and must be reassembled from diverse sources, the process of combining original negative and fine grain master footage will come under consideration, as well as the problem of finding restoring and re-integrating title material.

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Implementing Fixity in Google Cloud

Buzz Hays, Google

By now, most archivists are familiar with the notion of fixity for digital resources. Fixity, an important aspect of media archiving, is the process of checking the data's integrity over time. The objective of fixity is that the data (the ones and zeroes of digital files) does not change over time, and if it does, we can detect that change and repair it, rendering the data back to its original and correct state. The primary tool for establishing fixity on data outside of the cloud – on LTOs, disks and other devices – is the message digest or checksum of the data. Fixity is traditionally done on local copies of the data from tape backups. But the vastness and complexity of the contemporary media archive and changes in the way that media technology is used are driving the movement of archival resources into 'cloud storage.' What happens to fixity when data is in a cloud – when it is disaggregated and sharded and submitted to erasure code. How do we establish the notion of fixity in an environment of resources shuttling in and out, and back and forth through different functionalities (post-production, distribution services, archival processing, deep storage) of the cloud? This will be a brief overview of how to implement fixity checks on long-term media archives housed in Google Cloud.

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The Reel Thing Technical Symposium is organized and coordinated by Grover Crisp and Michael Friend

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