The Real McCoy:
What Audiovisual Collections Preserve

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Abstract

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This paper presents a structured approach to authenticity, with four levels representing various kinds of distance from an original physical event that has been recorded, and distance from that original recording.

While there are social, historical and intellectual-property dimensions to authenticity, there is also the physical level of the preservation of technical quality. The four levels of authenticity – the structured approach – cover how *authenticity* relates to the original *artefact*. A separate consideration of the *content* is needed, and physically the *content* is a *signal.* The engineer's view is: *audiovisual archives save signals*, in various ways with varying success.

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The Real McCoy: What Audiovisual Collections Preserve

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1 Introduction

All archives hold content to fulfil a social and intellectual purpose, but along the way they have to deal with physical items in physical ways. A particular issue for audiovisual archives is that our physical items – the lowly "*carriers*" – disappear, as *content* is migrated or digitised. When the physical carrier is gone, and the content has (we hope) been moved on, what happens to *authenticity*? Is the original artefact the only authentic object? How can a new physical item be authentic? What are the relative authenticities of multiple versions of one original recording or production? And how can invisible files stored somewhere on mass storage -- perhaps even 'in the clouds' on cloud storage -- ever claim authenticity?

One way to deal with complicated issues is to break them into smaller pieces. This paper presents a structured approach to authenticity, with four levels representing various kinds of distance from an original physical event that has been recorded, and distance from that original recording.

While there are social, historical and intellectual-property dimensions to authenticity, there is also the physical level of the preservation of technical quality. The four levels of authenticity – the structured approach – cover how *authenticity* relates to the original *artefact*. A separate consideration of the *content* is needed, and physically the *content* is a *signal.* The engineer's view is: *audiovisual archives save signals*, in various ways with varying success. The success can be measured, formally and objectively. Archives preserve things -- that's what they do. The engineer's view of authenticity provides a physical, objective way to measure how well we are preserving things.

2 We Are On a Journey

Audiovisual archives are young archives. None of the major collections and institutions pre-dates the 20th century, and many collections and institutions started much later: while the BBC had a formal, catalogued gramophone collection that began around 1930, the formal television archive dates from 1972[1]. The Netherlands Institute for Sound and Vision[2] was established in 1997, though of course it contains material going back to a century earlier. The French Institut National de l'Audiovisuel began in 1975[3]. Any formal audiovisual collection that pre-dates 1920 is rare. The Imperial War Museum in London is described[4] as "arguably the world's oldest film archive (it was founded in 1919)". Regarding cinema film, one archive states[5] "The first film archive in the world was established at the Museum of Modern Art (MoMA, New York) in 1935".

These collections are young (compared, for instance, to museums with paintings that are hundreds of years old, and statues that can be thousands of years old) because their holdings are young: the sound and image – and moving image – recordings from a technology that is itself less that 200 years old.

2.1 Images

The journey begins with the permanent recording of images – not drawings or etchings of 'what the eye sees' – but the physical pattern of light and dark, through an aperture and onto a recording medium.

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Figure 1 - Louis Daguerre; image made using his own process.

Here is Louis Daguerre in a Daguerreotype. His image represents the dawn of photography[6] during the period from about 1830 to 1840. There was world interest, and many competing processes.

In the UK, the earliest method of photography was developed during the period 1835 to 1841 by Henry Fox-Talbot – the Calotype.
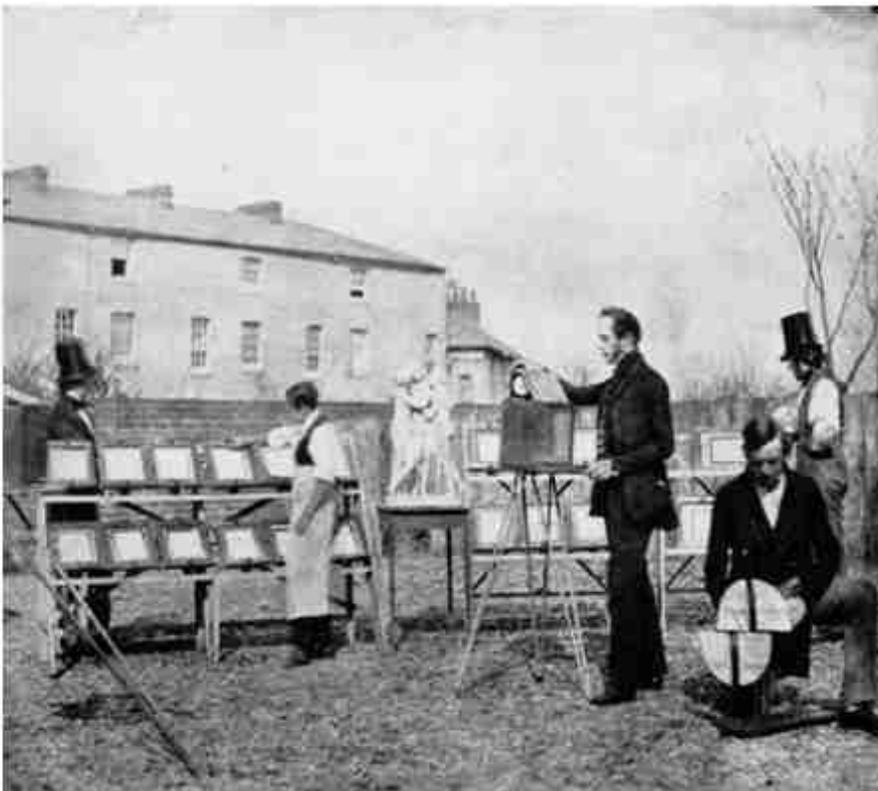

Figure 2 - A Calotype of a Calotype studio in Reading, England ca 1845.

The Calotype method used a negative, from which multiple positives could then be printed – allowing not only the recording of a visual scene, but also supporting reproduction in quantity. It is the ability to make many copies (even millions) which distinguishes audiovisual recordings from other kinds of content found in museums and archives. The ability to make copies is a breakthrough, but in turn has been a major source of problems regarding *authenticity*. A Daguerreotype was unique, but the Calotype introduced the problem of establishing the provenance (and assessing the quality) of "copies of an original".

2.2 Sound

The recording of sound is usually viewed as coming many decades later than photography, with the patents by Edison[7] (1877-78) and Berliner[8] (1887). However researchers have recently performed image processing on traces of an acoustical wave recorded thirty years earlier, by a process patented in 1857 by Édouard-Léon Scott de Martinville[9]. The method made tracings in lampblack (carbon layer) on a surface, and some of these tracings have survived into the 21st century.

Unfortunately there was no reverse technology! The acoustical waves were successfully replicated in a way that could be viewed (making sound visible, and so becoming one of the many forms of 'visible speech' to be developed over following decades) and so the sounds could be seen, preserved, and even published in books – but not played back.
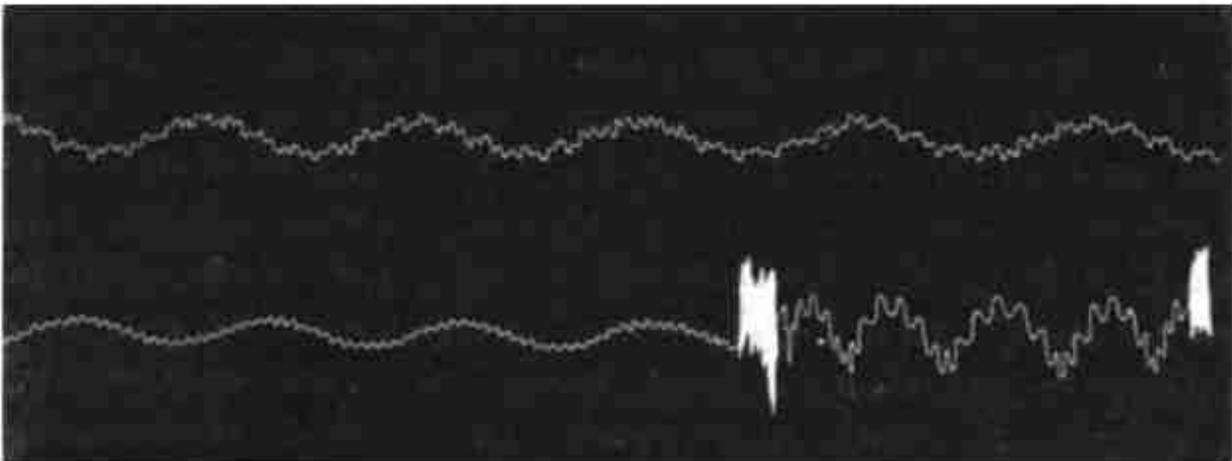
Figure 3 - Two sound waves printed in an 1868 physics textbook.

The illustration shows the result, which is surprisingly clear and comparable to looking at a microphone signal on an oscilloscope in a modern lab. However in 2008 researchers at Lawrence Berkeley Laboratories (who have for some years been investigating optical methods for recovery of recorded sound) applied their technology to the various phonautograph recordings (phonautograms), and produced recognizable results[10], including the song "Au clair de la lune". This result is available online[11].

However the invention that brought sound recordings into people's homes and lives at the end of the 19th century was the Edison cylinder phonograph[12], followed by the Berliner disc gramophone.

Figure 4 - Edison and his tinfoil cylinder phonograph.

The phonograph created a sound-recording industry, brought recorded music into households across the world, and also created millions of potential artefacts for audiovisual archives. The cylinder format was replaced within two decades by the disc gramophone of Berliner, because a flat object was easier to replicate (press) in the thousands and even millions that were needed to meet demand. The gramophone record was eventually (in the 1980's) thought to have been replaced by Compact Disc and later digital formats, but the pressing of new gramophone recordings continues – and a whole new generation of "vinyl enthusiasts" keep the format and its associated technology alive.

2.3 Moving Images

During the last decade of the 19th century the race was on to move from the capture of still images to moving images. Devices such as the Stampfer Stroboscope[13] were built in the 1830s that could trick the eye, using brief exposures to rapidly changing still images to create the illusion of motion. The problem was: how to get the images. Muybridge[14] had (at enormous trouble and expense) used arrays of still cameras controlled by tripwires in order to photograph a galloping race horse at sub-second intervals (exposure times of 1/1000 of a second, approximately 18 exposures per second[15]), but there was no practical way to produce the necessary large volumes of still images.

In the 1880's various technologies came together. George Eastman produced photographical film on a roll (1884) as a much cheaper and more convenient replacement to the photographic plates that had been used until then. Various cameras were developed in that decade, but the first to be successful enough to come out of the lab was the Edison Labs Kinetograph[16], patented in 1891.

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One problem with developing a commercially-viable cinema camera was that there was no cinema industry, no audience – and no projector to show the moving images to an audience. The Edison Kinetograph was matched with a Kinetoscope for viewing, but this was a peep-show device used by one person looking into a viewer.

The brothers Lumiere[17] solved the projection problem with their Cinématographe[18], an astounding device that exposed film, developed it, and then could project the result to a room full of people (which they demonstrated in Paris in 1895)!
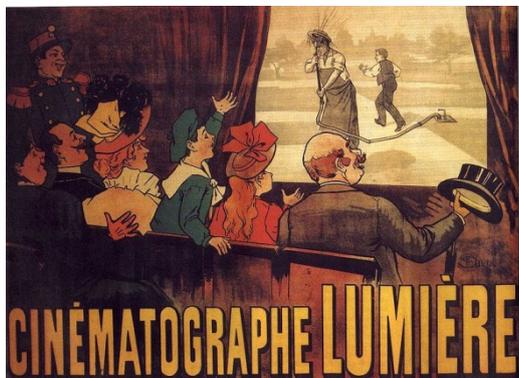

Figure 5 - Lumiere Cinématographe.

Sound recordings went almost immediately into people's houses. Audiences did not gather to hear gramophone records, though audiences certainly did gather to dance (or eat or drink, to name a few activities that could be conducted against 'background sound') to recorded music. Films however were expensive to produce, distribute and project – but wonderful to see (and eventually, hear) – and so the cinema building (picture palace, movie house, bioscope – even simply 'the theater' (US spelling, for a US term) for the author when a child in hinterlands where there was no live theatre) – was born, a new form of architecture and new place of public entertainment.

2.4 Broadcasting

With the arrival of the 20th century, the face of audiovisual technology had transformed. The year 1880 had no audio or moving image recording, and photography was limited to expensive professional plate-based cameras. The new century had Kodak Brownie[19] cameras and cylinder players in ordinary homes – and a growing audience for the new cinema industry.

One might have expected matters to stop there. Sound was recorded, reproduced, and easily accessible – there were even home wax cylinder recorders for the privileged (all forms of sound recording remained relatively expensive until the development of the audio cassette recorder, still 75 years away). Photography was inexpensive enough that the Brownie (at $1) could sell in millions[20]. And the ultimate miracle had happened: moving pictures. What more could anyone expect?

Whether they expected it or not, what people got next was 'wireless communication' – invented as a replacement to the telegraph and telephone as a method for long-distance person-to-person contact, but soon seen as having mass communication potential: one transmitter could reach thousands of receivers. The British Marconi company was founded in 1897, concentrating on ship-to-shore communication. Initially messages were sent to individual ships, but the practice quickly developed of sending weather information and warnings to all ships in an area, at scheduled times: the *broadcast*. To this day, the BBC completes its daily broadcast programming on Radio Four with 'the shipping forecast'[21], and millions are lulled to sleep to a litany of wind speed and direction, atmospheric pressure and other statistics from North and South Utsera, Faroes, Cromarty and on around the shoreline.

From these practical beginnings radio was born, the most used mass-communication technology[22] ever devised. The BBC launched in 1922 as a private company, and became a public corporation with license-fee payer support and a public-service remit in 1927. Radio rapidly became important to national life. In the USA, Franklin Delano Roosevelt instituted weekly 'fireside chats'[23] to combat

the fear and panic associated with the Great Depression of the 1930's. Governments of all descriptions recognized the importance of radio – the BBC had to stand up to government attempts to control its news reporting[24] as early as the General Strike of 1926.

The 1920's also saw early attempts at carrying moving images wirelessly, a process eventually known as television. The BBC began scheduled trial services in 1932, and officially launched their television services in 1936, though the broadcasts were suspended during World War Two. Television launched and re-launched across the world in the post-war period.

The particular difference between broadcasting and the other forms of audiovisual content is that there was no obvious artefact to even attempt to keep, much less to evaluate for authenticity. Radio could be recorded (before the 1950's) but only by cutting an acetate disc, an expensive investment. The tape recorder was not common until the decade of the 50's.

The inventor of one type of television, John Logie Baird, also invented a method of recording his output[25] on gramophone records, but that was a technical curiosity on par with the phonautogram recordings for sound. Images were recovered[26] over 60 years later, but there are only six of these recordings. The main method for recording the early decades of television was film, which remained cheaper than videotape right up until the 1970s. Film was also more portable than the first few generations of videotape equipment, so the BBC used film for newsgathering until 1982 and the switch to the U-Matic videotape format. The consequence is that broadcast archives have large film collections: the BBC has over 250 000 hours of film (about 40% of its 700 000 hours TV archive)[27].

Photography, sound recordings, motion pictures, radio and then television: the audiovisual record of the 20th century (and for photography, a significant part of the 19th). The dramatic developments in technology, particularly from 1880 to 1900, created content that people and institutions knew was important. Gradually copies came to reside in institutions, but without knowledge or accepted practice about how to evaluate the content for authenticity. We now have 'holdings', but how do we really know what we hold?

3   The Problem with Carriers

The 19th century created the technology for recording images, sound and moving images. The 20th century saw significant industries built around these developments, creating hundreds of millions of artefacts of potential significance. The broadcast industry was born in the early 20th century, and grew into *mass communication* – heard and seen by billions of people, many spending over 20 hours per week listening and viewing. The development of audio tape recording, followed closely by video tape technology – plus the use of film to record television (telerecording) – has allowed the building of large audiovisual collections, with millions of artefacts (the UNESCO estimate[28], based on Presto[29] and other surveys, is 200 million hours of audiovisual content in formal collections, globally).

The essential problem is expressed in the last sentence: the holdings of interest are the 200 million hours of *content,* NOT the 400 million or so physical artefacts that *carry* the content.

3.1   Carrier and Content

In most collections of 'things to be kept' – ranging from document archives to museums to historical monuments like Stonehenge or the Lascaux caves – the artefact is exactly the thing to hold onto. In general, objects like statues and paintings are not seen as carriers of anything; they *are* 'the thing'.

For audiovisual content, the original object presents a whole range of problems, as set out in the original Presto survey (reference 29) – that found 70% of audiovisual holdings to be at risk from obsolescence, decay – or simply too fragile to be used.

The issue of carrier vs content is still debated in film, and the book and document world is beginning to talk about 'destructive digitisation'[30]: keeping the 'words' (and the look) of documents by scanning them, and then throwing them away (to save conservation costs).

Audiovisual archives have already made up their minds about the intrinsic value of the original carrier, and the formal position (at least, as set out by the International Association of Sound and Audiovisual Archives, IASA, in their landmark publication TC-04[31]) is that it is the content that matters, *not* the carrier:

> 1.2 The aim of preservation is to provide our successors and their clients with as much of the information contained in our holdings as it is possible to achieve in our professional working environment. …

> 1.3 As the lifespan of all audio carriers is limited by their physical and chemical stability, as well as the availability of the reproduction technology and, as the reproduction technology itself may be a potential source of damage for many audio carriers, audio preservation has always required the production of copies that can stand for the original as preservation duplicates …

Our topic in this paper is authenticity, but we are now faced with the fact that we cannot, in general, keep (or at least, use) the actual physical object that enters a collection: the carrier will become obsolete, or will decay, or become damaged; this will happen!

3.2 Carrier and Originals

There are many more reservations about 'preserving the original' in an audiovisual collection:

- The artefact entering the collection is rarely the 'original recording'. For commercial audio (from wax cylinders onwards), the artefact is one of hundreds or thousands or even millions of copies, produced for mass distribution. The same is true of cinema prints and commercially distributed video formats such as VHS and DVD.

- In broadcasting, the item entering the archive is (often) the final programme; original recordings have been edited, often many times, to produce the final 'master'.

Immediately we are faced with evaluating the technical state and quality of the content, if not as an authenticity issue then certainly as a 'how can we best preserve and maintain the original content?' issue – generally in the absence of any actual 'original content' to compare against!

True original recordings (in audiovisual collections) are rare: there are (some) master metal pressing discs[32] and acetate master discs in commercial music collections, and relatively large numbers of acetate (also called lacquer) transcription discs[33] in broadcast radio collections. Research collections (eg ethnology field recordings) have high percentages of original content, but broadcast recordings of pre-recorded material are the result of an editing process. Live radio and television that has been recorded for archiving produces recordings that are often 'first generation' – but ironically are also very often of lower quality. Much live output was recorded 'off-air' at less than studio quality; live television (before videotape became relatively cheap) used the film telerecording process to get a video image onto film – and so the image on the film is hardly the 'original' signal that was transmitted. In the BBC, for several years (1967 to early 1980's) colour broadcasting was often telerecorded in black and white[34] – because colour film telerecording equipment was not in mainstream use and gave poor results, and there were pressures to reuse videotape as it was too expensive simply to archive.

4   Authenticity of Audiovisual Holdings

The situation is complex. We often do not hold originals, in the sense of original painting vs copy. We mainly hold copies, and where we have true original recordings we know we cannot rely on them to preserve the content – because of obsolescence, decay and fragility. Acetate (lacquer) discs are an obvious example: they dry out and crack, the lacquer coating can flake and chip off, and even a disc in good condition has to be played on proper equipment with a proper tone-arm and needle, or it will not only reproduce poorly, but will be damaged. Finally, as with film, even proper use of professional equipment risks damaging the material, so these carriers need to be played as seldom as possible (protection of the masters).

Figure 6 - A damaged acetate disc.

4.1   A Structure for Authenticity of Audiovisual Recordings: Levels of Authenticity

Where do we start, to have some secure sense of use of such terms as 'authentic recording', authentic copy, authentic master? The following is a structure for charting the distance between an item that could be found in an audiovisual archive, and the origin of the content that the item carries.

Type 1: The original event

Throughout, we are discussing sound and image (particularly moving image) *recordings*, so the starting point is: what was being recorded? An engineer's view of authenticity includes the idea that we know what things look like, and sound like, and so we can judge (and to some extent measure) a good recording as contrasted with a bad recording. An archive can hold an authenticated original recording (meaning there is a provenance record establishing that the recording is indeed an original and was made at the time and place indicated) but it can still be a *bad* recording.

A more interesting situation is where various copies or partial copies exist, and an archive wants to select "the best" for preservation. There are social and historical dimensions to such a selection, but there is an important engineering dimension: which version has good images and good sound?

In general, the realities of the *original event* can only be imagined. We have images or sound, or both, but we cannot prove how much was missed or poorly captured. Although audio and image recording techniques were wonders when first invented, it is worth remembering how much of an original event is never captured. The sound field is a three-dimensional acoustical space that is only sampled by placing one or more microphones inside that space. The pattern of light is similarly three-dimensional, and usually is only captured by a single electronic eye at one position, or by editing the outputs of several such monocular viewpoints in the case of multi-camera film and TV productions. Stereo images have been made for over a century[35], but little archive content is in stereo. We can imagine a future with holographic video (and audio) recordings that will allow a much more complete recreation of the original sound field and light field, but what our archives hold are still a closer to a view through a pin-hole camera than to the effect of actually being at *the original event*.

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Figure 7- Frances Densmore records Mountain Chief.

Type 2: The original recording

As has already been stated, true originals are hard to find. In the figure above, a wax cylinder is being cut directly from the acoustical energy produced by Mountain Chief, captured through the horn and fed to a cutter that carves into the blank cylinder. Such 'direct recording' cylinders exist, but most collections of wax cylinders contain commercial recordings that are copies generated from an original recording – and of course would probably by now have been migrated to audiotape or a digital file. Wax cylinders are susceptible to mould; they are fragile to begin with, and become increasingly fragile as they age and dry out; and they can be damaged simply by being played (the groove is altered by the very needle used to play the cylinder).

However when originals have been preserved, they certainly have a special status – they are as close as we will ever get to *the original event*, and so have their own place in this hierarchy.

Type 3: The preservation copy

Logically, after an original recording come the various kinds of copies, and copies of copies. But there is a kind of copy that deserves its own place in this authenticity hierarchy: the *preservation copy* or *archive master copy*. Just because actual originals are so rare, archives mainly deal in copies.   One such copy (the only one the archive has, in many cases) carries the best available version of the content that we want to preserve, and so is designated as the *preservation copy*.

Type 4: The copy

Various access copies can be generated from the preservation copy, such as prints from film negatives, audio CDs and MP3 files from master sound recordings, VHS or DVD or highly-compressed file formats made from video masters. Such proxies have their own level. Regarding authenticity, if the provenance can be traced with certainty, then all *complete* copies have the same provenance in terms of being copies of the same original event, and all derived from the same original.

Immediately problems arise, particularly for complex productions. A cinema production is made over a considerable time, and has many camera negatives – the only true Level 2 originals. A complicated chain (there are similar complicated chains in the broadcast productions) leads to a one or more master negatives or interneg prints or interpos prints, from which the distribution prints

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are generated. All of these artefacts (with the exception of the camera negatives) are copies of some sort, but they are certainly not all equal. Simple hierarchy meets complex reality: archive experts to have to know something to be experts, and one such area of knowledge is about distinguishing between different sorts of copies.

Copies can differ according to their distance from the original: a first copy, second copy and so forth. We commonly speak of generations and of a potential *generation loss* when making copies of copies, and careful archives may actually know the generation number of a given copy. Copies can differ by provenance: one may be made from an original commercial release, other may be made from different versions. Copies differ in their technical quality, which should be in proportion to their generation number but in practice the quality of any copy cannot be simply predicted from provenance and generations number – and the copy has to be actually viewed, listened to and technically assessed in order to determine its audio and image quality.

We could assign numbers to these copies, so that a 4.1 would be one generation away from a Type 3 preservation copy, and a 4.2 would be two generations. This might even be worth attempting, but there is a major complication, which is in a way the whole point of this paper: **the preservation copy is not a permanent copy.**

4.2 The "new master"

For a century, audiovisual collections have had to accept the fact that content existed only because it was on some kind of carrier, and that carrier had a limited useful life – at which point the content would have to be migrated to a new carrier, and a preservation copy would be replaced by a new preservation copy. This situation has elements of the absurd and tragic, as well as large amounts of contradiction. The original is long gone or never got to the archive in the first place, the preservation copy is about to become unplayable (obsolescence, deterioration, fragility) – and the archive is forced to move the content onto something new – forming a *new preservation copy*.

There are many ways to make a new master, and a range of problems:

- What was the original audio and image content?

- In the existing preservation copy, what constitutes damage, and can that be separated from technical limitations in making the original recording?

- What should be done about repairing damage?

- What should be done about restoring the content to the original quality – the quality of the original recording (if such restoration work can be done, and if there is any clear idea and agreement about what exactly the original quality was)?

- Should we not seize the opportunity, and fix up defects in the original, to make the content "as good as we can make it"?

- How far should we go with restoration?

These questions are not answered in detail, but this paper does intend to bring clarity and structure to the situation by identifying *preservation copy* as a special level (three) in a content hierarchy.

The essential rule for making a replacement at level three has already been clearly set out by the audiovisual archiving profession. Regarding principles and ethics, Ray Edmundson[36] advises: "As far as possible, the new preservation copy should be an exact replica of the original: the content should not be modified in any way." Just to be very clear, I understand the use of the word original in this quote to mean 'existing preservation copy, not 'original recording'.

If this rule is followed, then a restoration could be level three and could be used in an archive as a new master version – but only if the restoration were confined to damage in the old preservation master. Anything that went beyond the quality of the preservation copy would make 'a new thing' – and new things are creation, not preservation. The new thing could be something which an archive might also want to preserve, but it would have to be preserved as a different (but related) kind of content. In authenticity terms, it would be a new preservation copy of something else, not a new preservation copy of the original content.
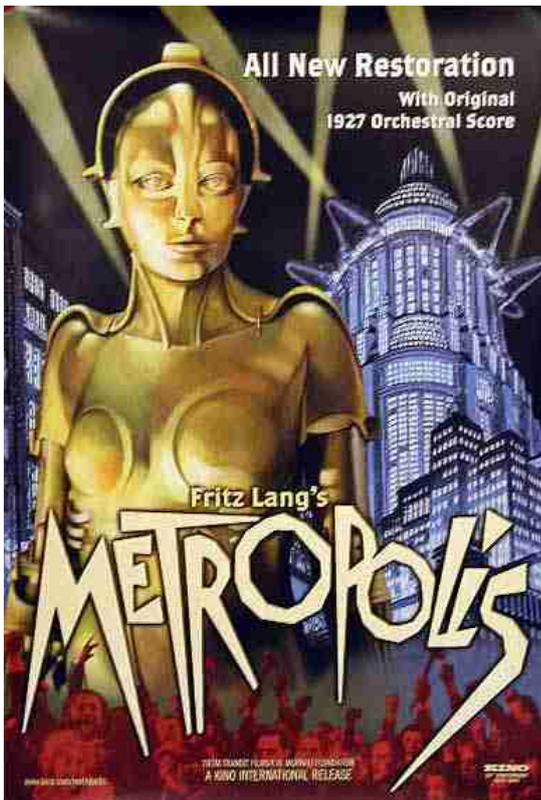
Figure 8 - A "New Restoration" – what's that?

Further – all *remasterings* that change aspect ratio, change the sound's dynamic range, 'create' stereo or multichannel audio from a monophonic original, change the colour space, make the image brighter and the sound louder – in short, all efforts directed to make something look more like what the modern media marketplace 'wants to see' rather than more like 'the original recording' – are creations of new things. These new things may or may not deserve a place in an archive, but they would come in as separate by related content, and have their own Type 3 and Type 4 copies – though sharing a common Type 1 and Type 2 (and perhaps even Type 3) ancestry.

Charting the exact relation between two Type 3 versions of the same Type 2 ancestor is specialist knowledge. As stated, people in archives, and using archives, do have to know things!

The hierarchy has stopped at Level 4: the copy made from a preservation copy. The divisions could continue, subdividing further by generation, by technical quality, by format, by purpose, by usage or access rights. However at this point the overall complexity of all the kinds of Type 4 copy probably defies simple categorisation.

One important step has been achieved with digital content: it is now possible to separate the content (the bits) from the carrier (the storage device) – and maintain the bits indefinitely (or at least try to do so). This separation means that in principle a *new preservation copy* can just be cloned from the existing file, and the result will be completely identical. But the digital world has its own problems – and format issues. If the preservation copy is in a file format that becomes obsolete, or uses a coding that becomes obsolete, then it, too, will have to be replace by a *new preservation copy*. These are the problems of digital preservation addressed by the PrestoPRIME project[37] and the PrestoCentre[38] competence centre and support network. Using standard file formats and uncompressed data representations for audio and video goes a long way toward minimising the digital preservation issues for audiovisual content.

5 Cases

Having set out the basic types of audiovisual carrier, and the principle governing making that odd thing, the *new preservation copy,* we now look at some cases that immediately raise problems.

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5.1 Windjammer – It Never Looked So Good

Windjammer is one of a small number of cinema productions made in the Cinerama[39] three-camera process, using three cameras (arranged in an arc) to make a very wide aspect ratio image that was projected on a curved screen. The viewer (if sitting far enough forward) experiences being surrounded by an image that occupies 80% of a semicircle (146°). The projection required three projectors arranged, again, in an arc equivalent to the arrangement of the original cameras. The projectors then ran synchronously and showed, essentially, three simultaneous films.
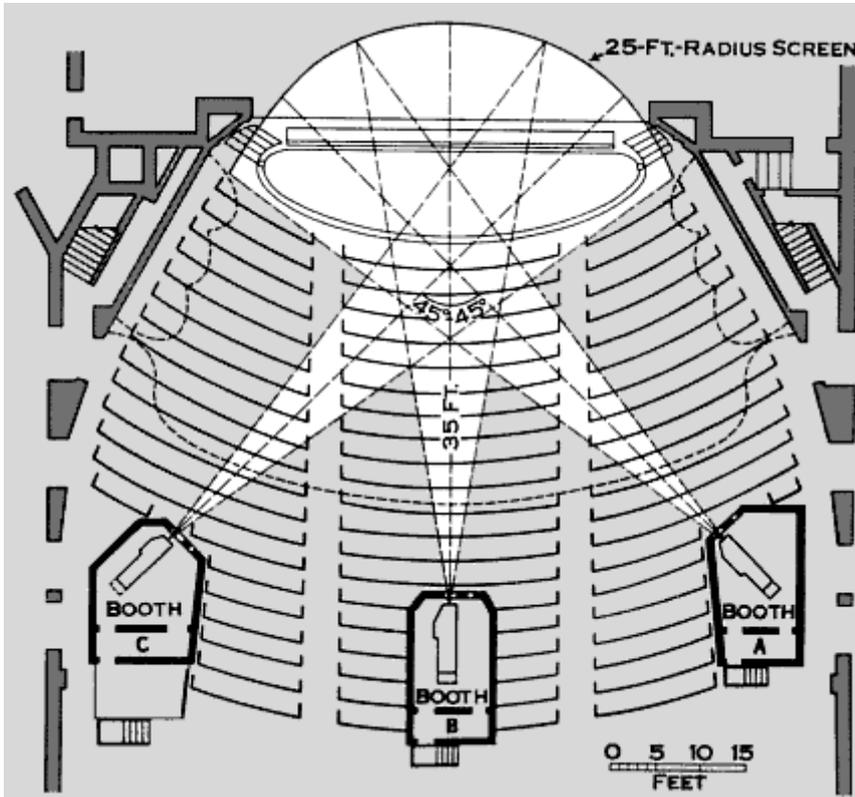

Figure 9 - Projection of true Cinerama.

The Cinerama technology was daunting and expensive. Relatively few such productions were made, and there are only a handful of cinemas that can now project using three cameras on the correct curving screen.

The remastered Windjammer film was shown at the Joint Technical Symposium in Oslo in May 2010. Two issues stand out:

- Making it better than ever: the remastering was done from a single 35mm Cinemascope anamorphic print (meaning the super-wide screen was squeezed into a narrower (but still very wide) format; the full width is recovered upon projection using a complementary anamorphic lens. The images from the original three prints do not register (align) perfectly in the print (nor did they in the original theatres using three projectors), and there are colour and brightness differences where the images overlap. With digital processing in the remastering, these defects or limitations of the original technology can largely be corrected, producing a single, homogeneous visual field with no irregularities. "It never looked so good"

- And then making it worse again: there are almost no Cinerama screens. Further processing of the Windjammer digital master can be used to simulate (or attempt to simulate) what a curved screen looks like when projection is actually on a flat screen. The technology is named Smilebox[40], and the following figure shows the result (on a different film: How the West Was Won[41]). It is said that people adjust, and perceive the 'smile' as a curved visual field – but it certainly did not work for me!

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Figure 10 - Cinerama projected by a single projector onto a flat screen, in Smilebox style.

In terms of the attempt at a classification of archive content, the remastered Windjammer is a "new Type 3" – and certainly not a replacement for the Type 2 three-negative originals, however much the technical quality has been improved.

As to the Smilebox version, that's a Type 4 proxy – an access version for cinemas without actual Cinerama projection facilities.

5.2 Dad's Army – Telerecordings and the Defective Master

As mentioned above, from 1967 until (in a few cases) as late as the early 1980's the BBC often made archive copies of colour television on black and white film, because during that period there was no mainstream use of film telerecording equipment for colour, and it gave poor results. There was also pressure to reuse videotape as it was seen as too expensive for archiving.

A colour video signal has extra colour information inserted into the standard luminance (black and white) signal, which is how colour programmes could continue to be viewed on black and white receivers during the long period (at least 20 years) when many people did not have colour television sets.

For the telerecording of a colour video signal onto black and white film, the colour information was supposed to first be filtered out, because it caused interference patterns on the monochrome studio quality screen used in the film telerecording equipment, and these patterns would persist on the film copy. These patterns would cause more issues when the film was later rescanned, since they would result in a spurious colour signal.

The BBC archive holds thousands of B&W telerecordings made from colour programmes during this period. For a subset of these, the colour signal was *not* filtered out, and the film contains the resultant patterns – so called 'chroma dots'.

Figure 11 - original colour video recording and 'chroma dots' in a non-filtered B&W telerecording.

Nearly forty years later, digital processing of high-resolution scans of these films allowed the dots to be turned back into a close approximation to the original colours. This was a near-miracle: recovering colour from B&W film!   A full half-hour of a recovered version of an episode of the popular series, Dad's Army, was recovered and broadcast in 2008 – the 40th anniversary year of the series.

A telerecording from a live signal is an original recording (Type 2), and a telerecording made from a videotape (the tape was then recycled) is a Type 3 preservation copy -- but a B&W telerecording of a colour programme is defective, because the colour was there to be recorded, but was lost -- or had been considered lost until the Colour Recovery Group[42] reconstructed the colour nearly 40 years later..

The new version resulting from the colour recovery digital processing is the result of a remastering process, but it also is closer to the original studio signal than the telerecording ever was (in the sense that the colour is accessible). So the archive now has a 'new Type 3' preservation master which is superior to the Type 2 original recording.

6   Summary: A Formal View of Authenticity

We have been discussing one dimension of authenticity – the technical dimension of the 'distance' between a recording in an archive, and the physical acoustical and optical phenomena that the recording has attempted to capture.

The following hierarchy has been proposed:

1. **The original event** – what was around the microphone and in front of the camera, which is gone forever. We compare the content of our recordings with what we know of how things look and sound, and so can divide recordings into good and bad (and lots in-between) irrespective of provenance or generation loss or indeed anything beyond how the recordings look and sound.

2. **The original recording** – a very rare and precious thing: the artefact that was produced when the original event was captured by audio, video or film recording.

3. **The preservation copy** – the archive master copy, which in rare cases is a Type 2 original, but in the general case is a copy – but the best copy the archive can obtain. The problem is that preservation copies become obsolete, or decay, or wear out – and so audiovisual archive have to perform an odd act: making a new preservation copy.

4. **Other copies** – all the copies derived from the preservation copy, for purposes of access of to 'protect the master'.

There is a related hierarchy of general interest to librarians and archivists: the FRBR levels[43] set out as a *conceptual model* of the bibliographic universe by the International Federation of Library Associations and Institutions (IFLA). It also has four levels:

1. Work – a distinct intellectual or artistic creation.

2. Expression – the intellectual or artistic realization of a Work.

3. Manifestation – the physical embodiment of an Expression of a Work.

4. Item – a single exemplar of a Manifestation.

There are some evident similarities between the FRBR levels and the Types described in this paper. Whether they are close or not, the FRBR work should be considered because it has more than levels, it also has formal relationships, such as:

- contains

- is a retelling of

- is a (non-series) sequel to.

What is really needed for archives to be more careful about authenticity – and quality and 'genealogy' and all the aspects of audiovisual content that have to be known and documented – is to have, *and use,* a similar set of relationships for audiovisual copies.

Such a set of relationships could start with something like the following:

- is a first generation copy of

- is an nth generation copy of

- is a subset (edited and shortened version) of

- is a different version of (editorial differences, eg new or alternative footage)

- is a remastering of

- is a reduced-quality version of

- is a new preservation copy of

- is a restoration of.

I hope this proposal can be taken seriously, and our documentation of audiovisual items (especially in those archives that are already serious about following IFLA standards and using FRBR) can include really specific information about Type and relationship. A cornerstone of any approach to authenticity has to be the ability to simply know what we're talking about. Without specific Type and relationship data (or some equivalent) it is far too easy to be vague and uncertain about audiovisual holdings.

7   The Real McCoy?

Americans use the phrase 'the real McCoy' to refer to something being 'the real thing' – to express a sense of authenticity. It is ironic that sources differ about the origin of the term, and quite possible there is no 'real McCoy' – because the phrase itself has drifted in pronunciation and spelling.

The Type 1 Real McCoy was probably[44] the G Mackay & Co Ltd distillery[45] in Edinburgh, and the Type 2 was their product, real Mackay Scotch whisky: "a drop of the real Mackay". Any Type 3 would NOT have been the real MacKay, because in whisky-making there may be imitations, but no copies. And Type 4 does not bear thinking about.

Pictures used (all Creative Commons sources except where noted):

1. Daguerre: http://commons.wikimedia.org/wiki/File:Daguerre001.jpg
2. Calotype: http://commons.wikimedia.org/wiki/File:Talbot_Atelier.jpg
3. Phonautograph: http://commons.wikimedia.org/wiki/File:Cours_de_physique_de_l_ecole_Polytechnique_-_ed_2_vol_2_1868_p509_-_phonautogram.jpg
4. Edison Phonograph http://www.loc.gov/pictures/item/brh2003000454/PP/
5. Lumiere http://commons.wikimedia.org/wiki/File:Poster_Cinematographe_Lumiere.jpg
6. Acetate UNESCO http://www.unesco.org/webworld/virtual_exhibition/records_big.html
7. Frances Densmore http://en.wikipedia.org/wiki/File:Frances_Densmore_recording_Mountain_Chief2.jpg
8. Metropolis http://en.wikipedia.org/wiki/File:Metropolisnew.jpg
9. Cinerama http://en.wikipedia.org/wiki/File:HowCineramaisprojected.gif
10. Cinerama Smilebox http://en.wikipedia.org/wiki/File:Cinerama-bd.jpg
11. Colour Recovery: BBC images

[1] http://www.bbc.co.uk/archive/tv_archive.shtml?chapter=6

[2] http://instituut.beeldengeluid.nl/index.aspx?ChapterID=8567

[3] http://en.wikipedia.org/wiki/Institut_national_de_l'audiovisuel

[4] http://bioscopic.wordpress.com/category/restoration/

[5] http://www.filmreference.com/encyclopedia/Academy-Awards-Crime-Films/Archives-THE-FIRST-GENERATION.html#ixzz1HtHXQMOv

[6] photography: http://inventors.about.com/od/pstartinventions/a/stilphotography.htm

[7] http://memory.loc.gov/ammem/edhtml/edsndhm.html

[8] http://memory.loc.gov/ammem/berlhtml/berlgramo.html

[9] http://en.wikipedia.org/wiki/%C3%89douard-L%C3%A9on_Scott_de_Martinville

[10] http://www.nytimes.com/2008/03/27/arts/27soun.html?_r=1

[11] http://commons.wikimedia.org/wiki/File:Au_Clair_de_la_Lune_(1860).ogg

[12] http://www.nps.gov/edis/historyculture/edison-biography.htm

[13] http://en.wikipedia.org/wiki/Simon_von_Stampfer

[14] http://en.wikipedia.org/wiki/Eadweard_Muybridge

[15] http://en.wikipedia.org/wiki/History_of_film Cameras 21" apart corresponds to 18 frames per second for a horse travelling at 378 inches per second which is about 22 miles per hour. Of course the faster the horse runs, the more frames per second!

[16] http://en.wikipedia.org/wiki/History_of_film The actual inventor was W K L Dickson.

[17] http://inventors.about.com/library/inventors/blmotionpictures.htm

[18] Lumiere Brothers
http://inventors.about.com/gi/dynamic/offsite.htm?site=http://www.holonet.khm.de/visual%5Falchemy/lumiere.html

[19] http://www.brownie-camera.com/

[20] http://www.kodak.com/US/en/corp/features/brownieCam/ 150 000 Brownies sold in the first year.

[21] http://news.bbc.co.uk/weather/coast_and_sea/shipping_forecast/

[22] 85% of Americans listen daily, and in the UK the weekly reach is 91%, with people listening to an average of 22 hours (per listener)
http://www.medialifemagazine.com/news2002/jul02/jul22/2_tues/news2tuesday.html

[23] http://www.presidency.ucsb.edu/fireside.php has all the transcripts, and a selection of recordings is also online: http://www.presidency.ucsb.edu/medialist.php?presid=32

[24] www.**bbc**.co.uk/historyofthe**bbc**/resources/factsheets/1920s.pdf

[25]

http://www.nationalmediamuseum.org.uk/Collection/Television/VideoRecording/CollectionItem.aspx?id=2003-5031

[26] http://www.theiet.org/publishing/books/history/19421.cfm

[27] BBC figures for the Presto project: http://presto.joanneum.ac.at/outcomes.asp#D 2 Archive preservation and exploitation requirements

[28] http://portal.unesco.org/ci/en/ev.php-URL_ID=17859&URL_DO=DO_PRINTPAGE&URL_SECTION=201.html

[29]

http://presto.joanneum.ac.at/outcomes.asp#D%202%20Archive%20preservation%20and%20exploitation%20requirements

[30] http://www.leeds.ac.uk/library/projects/lifeshare/casestudy4.html

[31] Guidelines on the Production and Preservation of Digital Audio Objects

http://www.iasa-web.org/tc04/background

[32] of course, some metal discs for pressing gramophone records are originals (direct cut), and others were themselves produced from recordings (on acetate disc or audio tape). For all forms of commercial recordings (audio, film, video) there is a complicated manufacturing chain between the recording studio and the final physical item in a collection.

[33] http://en.wikipedia.org/wiki/Acetate_disc

[34] http://colour-recovery.wikispaces.com/

[35] They were shown at the London Great Exhibition, 1851 http://www.bitwise.net/~ken-bill/stereo.htm

[36] Edmundson, R; Audiovisual Archiving: Philosophy and Principles, paragraph 6.4.6 (p56) available free at: http://unesdoc.unesco.org/images/0013/001364/136477e.pdf
[37] http://www.prestoprime.org/

[38] http://www.prestocentre.eu/

[39] http://cinerama.topcities.com/

[40] http://www.cineramaadventure.com/smilebox.htm

[41] http://en.wikipedia.org/wiki/How_the_West_Was_Won_(film)
[42] http://colour-recovery.wikispaces.com/

[43] FRBR: http://techessence.info/frbr   http://www.frbr.org/

[44] http://en.wikipedia.org/wiki/The_real_McCoy

[45] http://www.archives.gla.ac.uk/sba/sbacolls/mk.html