Digital Access of Online Archival Video

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Introduction

Digital access to video has now become a major issue in preservation. Advances in technology and the proliferation of broadband internet access has, happily, made available to the general public video (and audio) that was once available only to researchers and some museum goers. What were once rare, seldom shown works are now a few clicks away for anyone with an internet connection.

While this is undoubtedly a positive development, it places a special responsibility and burden on archivists and preservationists. These professionals will need to think carefully about which formats and codecs will be in use in the future, and which are at risk of becoming obsolete in ways that could hinder or prevent access. Within the next few years, with the introduction of even more video formats and codecs, choosing between one or the other will become an important decision. In effect, organizations dedicated to providing useful online video access will have to continuously evaluate and make bets on the viability and durability of new formats. These organizations typically have limited resources, so the outcome of these bets will greatly affect their ability to make content available to a wide audience.

Looking primarily at Anthology Film Archives' online access program, the New Museum's XFR STN project, and the expansive Europeana project, this paper will explore the challenges of creating online access to video collections, particularly in regard to the variety of formats and codecs that have been in use at these organizations.

Obsolescence Problems: Formats, Codecs, and Playback Devices

Over 80 analog video formats were introduced in a 40-year period between 1960 and 2000. In spite of (or, at times, because of) this proliferation, many of these formats are now quite rare due to the lack of working playback systems. A few formats also had very short shelf lives, even though were touted at the time as breakthroughs[1] [2].

Unlike film, which, if stored properly, can last at least a century, there isn't really a way to preserve video without some form of degradation taking place. To make things even more complicated, analog video is now essentially a dead medium. Since digital formats have taken over almost no decks and tapes are being manufactured for any analog video format.

Analog preservation issues are still very much with us in the digital era, especially in video. Just last year, William Clark, the last person who repaired and could manufacture parts for the 2-inch Quad videotape machine, retired[3]. There was

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[1] The MII analog video format, for instance, was made by Panasonic to replace Sony's Betacam format[4]. It debuted in 1986, with NBC exclusively using MII equipment for their broadcasts. By 1992, the format was dead, with NBC switching to Sony's D2 digital format, due to it being chosen by other companies, and for its ease of use[5].

[2] Author Unlisted. "Obsolete, Rare, and Old Videotape Formats - MII" DC VIdeo. 2013.
        <http://www.dcvideo.com/ql-obsolete-panasonic-m-and-m2.php>

[3] Author Unlisted. "Group History" Quad Videotape Group. 2013.

an enormous panic among people who had 2-inch Quad collections, because of the very real fear of permanent obsolescence. And obviously, any material that resides on those formats will eventually be lost as candidates for digitization, and therefore, for online access.

However, analog video preservation is usually on the back-burner for most archival institutions. Even the Library of Congress took a very long time to embrace video preservation, before finally coming up with a system of their own. With the 2007 opening of the National Audio-Visual Conservation Center (also known as the Packard Campus) in Culpepper, VA, LOC began using the SAMMA robot system to assist in tape conversion. This system works continuously to losslessly[4] digitize massive amounts of videotape of various formats. The digital files are backed up on various servers throughout the country, and the lossless files can be compressed into more manageable access copies for researchers. These access copies are available by request only and involve a fee[5].

The shift to digital has been rapid, with video and audio technologies evolving greatly in just the last ten years, especially in regard to the internet, which has caused the greatest advance in access since the advent of television itself. In 2003, we didn't have YouTube or Hulu, and the iTunes store sold only music. The iPhone wouldn't be introduced for another four years. HDTV was very slowly inching its way along in sales, and Netflix remained a disc-only mailing service. What little online video content there was, was usually of extremely low quality. This was in part due to the fact that 71 percent of internet users were on 56k modems,[6] and didn't have the bandwidth required for high-quality streaming video. Going back another 10 years to 1993, digital video and audio were used almost exclusively by industry professionals[7], and these files were usually output to analog formats.

Digital, of course, has its own archival issues. One of the most common misconceptions is that once a digitized file is made, it will last 'forever'. In reality, digital files are very much prone to loss and failure, as well as obsolescence.

Bit rot is the term given to files that have had their 1s and 0s swapped as time goes on, resulting in an unreadable or corrupted digital file[8]. Commenting on bit rot, the British Library's head of digital preservation, Adam Farquhar said, "If

<http://www.quadvideotapegroup.com/Group%20History.htm>

[4] A lossless transfer carries over a perfect, uncompressed version of a digital signal.
Author Unlisted. "Library of Congress: Compression" Library of Congress. 2006.
< http://memory.loc.gov/ammem/pictel/mddp308.htm>

[5] Author Unlisted "Requesting Materials in the LOC Catalog" Library of Congress. December 2011.
<http://www.loc.gov/rr/pdf/requestingmaterials-dec2011.pdf>

[6] Grabham, Dan. "Who Still Uses 56k Modems, and Why?" Techradar. 2008.
<http://www.techradar.com/us/news/internet/who-still-uses-56k-modems-and-why-471022>

[7] "Desktop Video" *Computer Chronicles*. PBS. 1990. Television
<https://archive.org/details/desktopvideo>

[8] Ingen, Catherine Van; Gray, Jim. "Emperical Measurements of Disk Failure Rates and Error Rates". Microsoft Research Coucil. 2005.

we're not careful, we will know more about the beginning of the 20th century than the beginning of the 21st century."[9]

And as with analog, there needs to be a way to play back the data. In the field of film preservation, one of digital's biggest headaches has been playback of Digital Cinema Packages (DCP)[10]. For example, a critics' screening of *The Avengers* had its file inadvertently deleted, delaying the screening[11]. The premier of Brian De Palma's *Passion* at the 2012 New York Film Festival was cancelled minutes before the screening was scheduled to begin because no one had the access codes for the DCP[12].

DCPs are simply a distribution format. There is a large array of uses for these formats and codecs, including acquisition (i.e. filming), editing, and distribution. Much like analog video, digital video has seen dozens of formats and codecs come and go over the intervening years.

A video format is a specific process for storing video images or data, and includes instructions on how to play back either a video signal (analog) or video data (digital). In digital, video is made up of two components: the container, which is the file structure, and the codec, which encodes the structure for playback[13]. Chris Lacinak, the President of Audiovisual Preservation Solutions gave a terse but eloquent definition of encoding as "a system used for transmitting messages requiring brevity or secrecy."[14] Every encoder needs a decoder in order to "exchange data losslessly"[15] and that's where the problem of compatibility comes in. A lack of a decoder could mean the file plays back fragmented, or doesn't play back at all.

Formats such as XDCAM and HDV are used almost exclusively for filming in broadcast television, and for the initial ingest into an editing software[16]. Oftentimes these are based in MPEG-2. Once the file is ingested, it is converted into an MPEG-4

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[9] Emmott, Bill. "Digital Archiving: History Flushed" The Economist. April 28, 2012. page 48

[10] I personally witnessed an example at Museum of the Moving Image in Queens. The projectionist had to get a technician from the film's distributor, Paramount, on the phone in order to get access codes to project a DCP of "Madagascar".

[11] Anderson, L.V. "How The Avengers Got 'Deleted'" Slate. May 12, 2012.
<http://www.slate.com/blogs/browbeat/2012/04/26/the_avengers_deleted_at_a_press_screening_how_the_digital_age_makes_it_easier_to_lose_movies.html>

[12] Hanna, Beth. "Filmmaker's Nightmare: NYFF Screening of De Palma's 'Passion' Hits a Digital Snafu" Inidewire. October 11, 2012.
<http://blogs.indiewire.com/thompsononhollywood/nyff-screening-of-de-palmas-passion-hits-a-digital-snafu>

[13.] Author Unlisted. "Video Formats: A Guide to Understanding Containers & Codecs." Rice, Fondren Library. 2009.
pages 2-3

[14] Lacinak, Chris. "A Primer on Codecs for Moving Image and Sound Archives". New York. Audio Visual Preservation Solutions. 2011.

[15] Lacinak. pg7

[16] Poynton, Charles. *Digital Video And HDTV - Algorithms and Interfaces.* Morgan Kauffman Publishers. Waltham, Massachusetts. 2012
page 452

proxy so that it is compatible with the editing software. Usually the default output once editing is completed is also H.264-based[17].

For consumer, distribution formats are the ones in use on websites that deal with video access, and on physical media such as DVDs and Blu-Ray. Any online video is lossy[18] by necessity, because using the uncompressed files for the access copy would be extremely impractical. Modern internet connections can still struggle greatly with streaming 4-5MB/s videos off of Netflix[19] [20] (In fact, the first few seconds of any Netflix stream will run at an even lower bitrate to allow the rest of the file to begin buffering and loading[21]). A low-end preservation quality file would run at 40-50MB/s[22], which would be unacceptable except for on-site access. Files of that size must be compressed so that they are actually possible to play given the limited bandwidth of a website, and the limitation of consumer electronics.

Organizations attempting to provide online access to archival video must wrestle with a number of factors, including technical considerations and legal considerations such as royalties and open source vs. proprietary code. In order to understand these factors a bit better as they relate to digital video, it is useful to look at various formats and codecs currently in use and why they are in use.

Possibly the oldest format still in use is MPEG-2, first introduced in 1995. MPEG-2, also known as H.262, remains in use on some editing software, in broadcast environments, and is used on DVDs. As an archival format it is being used in very limited capacity. MPEG-2 is slowly being phased out by the Library of Congress as an access and back-up format, with plans to stop making MPEG-2 files altogether in the near future due to limited demand[23].

Introduced in 2003, H.264 is Apple's favored video format for online access at the moment[24]. Like most formats, H.264 is lossy, but has become very popular as an online access format, due to the high picture and audio quality one gets from a relatively small file size. Both Netflix and iTunes currently use it for video encoding. Apple made a very big push for the format when the iPhone was released in 2007, favoring H.264 over Flash-based video formats[25]. In addition, Flash has been phased out of every portable Apple device, with some video providers adopting H.264 so

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[17] Poynton, p457

[18] Lossy files have some level of compression done to them; in other words, they are an approximation of the original.
Author Unlisted. "Library of Congress: Compression" Library of Congress. 2006.
< http://memory.loc.gov/ammem/pictel/mddp308.htm>

[19] Parker, Michael. *Digital Video Processing for Engineers: A Foundation for Embedded Systems Design.* Newnes. Sebastopol, CA. 2013.
p133

[20] Netflix streams HD video at around 1.8GB per hour. An hour of 10-bit uncompressed video starts at 100GB, and file sizes can range as high as a terabyte or more.

[21] Parker p93

[22] Poynton. p120

[23] Author Unlisted. "MPEG-2 Video Encoding (H.262) - Sustainability" Planning for LOC Collections. 2013
<http://www.digitalpreservation.gov/formats/fdd/fdd000028.shtml>

[24] Poynton p118

[25] Parker p122

that their content can be played on Apple devices[26]. H.264 is also very malleable, and can be adapted to support a number of video resolutions (such as m4v, AVC-HD, and MPEG-4 Part 2). However, the format is not open-source. Certain add-ons to H.264 are copyrighted by Apple (such as the .mp4 format), and the overall components are owned by MPEG LA, a patent firm[27].

Compatibility and copyright problems with HTML-5 has kept H.264 from being a fully dominant video format. HTML-5 is a revised version of HTML, which has been in use since 1990. Essentially, HTML dictates the basic structure of websites, including what video formats are compatible with it. HTML-5 has become widely adopted in the last few years, with Google and Netflix using components of it in their sites[28]. HTML-5 was made with an emphasis on using open-source, royalty-free formats[29]. Because there is no general agreement regarding a standard format, H.264 can be used within the HTML5 framework.

Although maintained by the Xiph.org Foundation, Ogg video and Vorbis audio have no restrictions on their use[30], and there has been a push to make them the standard media formats of HTML-5. Further innovations in open-source audio have been made with high-bitrate and lossless formats, such as FLAC and Opus, which have been championed by audiophiles, but have seen limited use in archival work[31]. If these formats were to gain more widespread acceptance in the field, which is unlikely since they are already several years old, they would be viable competitors to H.264.

At present, next-generation video formats and codecs are being worked on, or are finished and waiting to be implemented. H.265, which Apple favors,[32] is in its final stages of preparation. A recent development in digital video encoding is the advent of lossless and lossy 10-bit video. Not only does 10-bit video, even in lossy form, offer greater color range and image clarity, it is also of even higher quality than raw image files[33]. 10-bit encoding is used in limited capacity on some websites, and is available for streaming video. Notably, Internet Archive makes some video files available in 10-bit, but only for download. 10-bit video has been slow to take off, however, as there is a limitation on many available playback devices, which can only handle 8-bit video[34].

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[26] Parker p134

[27] Parker p133

[28] Lacinak. p7

[29] Vance, Ashlee. "Meet the Defenders of Open Source" The New York Times. September 26, 2010.
    <http://www.nytimes.com/2010/09/26/business/26ping.html?_r=0>

[30] Poyoton. p322

[31] Poyoton. p324

[32] Poletti, Therese. "OKI Achieves H.265 Compatability and Succeeds in 4K Video Distribution" Market Watch. November 12, 2013.
    <http://www.marketwatch.com/story/oki-achieves-h265-compatibility-for-oki-mediaserver-and-succeeds-in-4k-video-distribution-2013-11-12>

[33] Ozer, Jan Lee. *Producing Streaming Video for Multiple Screen Delivery*. Doceo. Galax, Virginia. 2013.
    page 272

35 Ozer. p271

Currently, the best bets for online video access are H.264 files, due to it being the most supported video codec presently [35]. 10-bit is still a few years away from having a real presence in online video, but should be considered when putting together a collection for online access.

The next sections of this paper will look at three organizations with divergent needs, constraints, and scopes. However, all three are committed to providing access to archival video online to a wider audience. How they chose to balance their demands against their available resources provide us some insight and real-world experience to draw on, as other institutions are currently contending with, or will be contending with, these same issues.

Case Study One: XFR STN and the New Museum

"XFR STN at the New Museum is committed to addressing the wider need in the community of artists for access to media capture and migration services as a means to preserve creative productions stored in aging and obsolete audiovisual and digital formats, and the massive storage infrastructure needed to steward these recovered materials. Within the parameters of "XFR STN," the Museum seeks to assist the greatest number of artists with a range of digitization services." [36]

Spearheaded by the New Museum in Manhattan, and Rhizome, a digital art organization, XFR STN (an abbreviation for Transfer Station) was an extraordinary and creative archival project that occurred in summer of 2013. The project involved the highly problematic issue of transferring analog video to digital files, as well as the transfer of born-digital files to newer, sturdier formats. Over 500 pieces of video art were digitized from five moving image formats and six born-digital formats during the project.[37]

XFR STN began as an attempt to preserve the Monday/Wednesday/Friday Video Club, a video artist group that exhibited and sold it's holdings on VHS[38]. In addition to the New Museum digitizing some of its own vast video art holdings, anyone with "artist-originated moving image or born-digital materials" was invited to migrate their work to lossless digital files, in order to preserve them for the future[39]. To further the idea of open accessibility, there was a public exhibition in addition to an ongoing art project.

In addition to more conventional filmmakers and documentarians, video artists became a driving creative force in the 1960s and 70s. Their emergence came with the introduction of affordable, portable video formats (such as UMatic and ½"

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[35] Parker. p93

[36] and 38 Einsohn, Gabriel. "New Musuem XFR STN Press Release" The New Museum. July 15, 2013.
<http://235bowery.s3.amazonaws.com/exhibitionlinks/88/2013.7.15.XFRSTN.PRESSRELEASE_2_V9.pdf>

[38] Author Unlisted. "M/W/F Video Club" Brickhaus. 2006.
<http://www.brickhaus.com/amoore/MWFdoc1.html>

[39] Gabriel

open reel), which they could use to express themselves. The availability of these formats changed not only art, but broadcasting as well.

Due to the complexity of the project and the desire to have the resulting files available online, it was decided early on to partner with Internet Archive. As the main collaborator on the XFR STN project, Internet Archive took on the responsibility of storing all of the resulting digital files at its facilities in San Francisco[40], and making them available through Archive.org.

As mentioned above, playback devices for certain formats are often difficult to come across. But the New Museum was committed to the idea of a free, easy, but still extremely high quality way of preserving these works.

The fifth floor of the New Museum was turned into a video conversion facility. Forsberg was able to procure state-of-the-art analog video equipment, which was used to calibrate all of the transfers. Due to the complexity of the analog image, it is generally considered good practice to make high-resolution versions of low-resolution analog video, so that no detail is lost. This is especially true in video art, where the imperfections and overall structure of the low-resolution video image are often part of the experience. Walter Forsberg even related that some of the video artists had to be discouraged from making their transfers look 'too good' so as not to betray the source material.

Access was a critical part of the project, with every video being uploaded to the Internet Archive in various formats, including lossless, once digitization was complete. The mantra of the New Museum and Internet Archive for this project was 'Distribution is preservation.'

For online access, all XFR STN video material is available via the page[41] for each of the 500+ videos, in uncompressed 10-bit Quicktime mov format (running an impressive 1.5GB per minute of video), compressed H.264 and Ogg, or as a Torrent with all of the files. XML metadata is available as well. Even the massive uncompressed files are there free of charge.

The New Museum initially wanted to use the Dublin Core metadata schema for the XFR STN project, as this is the same schema they use for their own digital archive. Instead, a slightly modified bootstrap XML schema was used, as the Dublin Core schema didn't have enough fields for a digitization project of this size. Each artist had to fill out a descriptive metadata report, so that as much information as possible was available for each video.

Not only did each participant have to give information on their video, they also had to sign a legal agreement that their work was now under Creative

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[40] One of the most impressive uses of digital storage, the Internet Archive, founded by Brewster Kahle, makes public domain and creative commons photos, music, film and video available to the public for free, with the option to download any material hosted directly from their website onto the users' own hard drive. The Internet Archive also features the Wayback Machine, which crawls websites and backs them up for future access.

[41] An example: https://archive.org/details/XFR_2013-08-22_1C_08. Downloadable 6.1GB file containing 4 minutes of video.

Commons, an alterative to copyright that allows one to freely use a work as long as the original artist is acknowledged.[42]

The XFR STN set up on Internet Archive is one of the best examples of online access to archival video as it allows users to not only stream the content, but also allows them to access the high-resolution original files, with detailed and BagIt-compatible XML technical metadata attached to every video. For Internet Archive, this download set-up is their standard. Every video on their website is downloadable in a variety of formats, and coupled with the metadata schema, allows a sort of DIY archiving for users.

The technology bets XFR STN and Internet Archive have made appear to be sound ones. 10-bit uncompressed video is right now the preferred medium for master versions of digital video, and the downloadable files are compatible with a wide variety of different applications and operating systems.

Case Study Two: Anthology Film Archives

Founded in 1969 by a group of filmmakers, preservationists, and critics, Anthology Film Archives has become an irreplaceable source for those studying "independent, experimental and avant-garde cinema."[43] Over the last several years, the organization has made great strides to begin offering some of its holdings for online streaming. This project has been a long time in the making, and has experienced many delays, in spite of a massive amount of digital master and access copies being made for several collections. The project is finally coming together, with plans to launch a digital collections website in the first quarter of 2014.

Like any library or archive dedicated to celluloid film, all of the actual preservation is done photo chemically, which is to say that a digital scan is not considered to be the master element. Instead, the original 35mm or 16mm film is.

The digitization of pieces originating on 16mm and 35mm film are made using extremely high-quality methods. Film elements are scanned on-site as DPX 12-bit log/lin image files, with 96khz, 24-bit uncompressed WAV files for audio. Mezzanine files are 10-bit with ProResHQ encoding. The massive DPX files are interim digital master files, and, as stated above, are not considered preservation grade, but instead intended only to make access copies.

Video is handled somewhat differently, as there isn't as much image information present on the originating format. Anthology, like the New Museum, is dealing with a variety of video formats, including 1", ½" open reel, Betamax, Betacam, Video8, and VHS. Digital video formats such as DV and DigiBeta are also dealt with.

Analog video is digitized to a lossless 10-bit uncompressed Quicktime file with a v210 codec. Audio is sampled at 48khz and 16-bit. From there, different derivative files are made in Apple ProRes and H.264 for both editorial purposes and access. DigiBeta is similarly digitized as a 10-bit uncompressed master file.

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[42] This entire section is based on email correspondence with Walter Forsberg.

[43] Author Unlisted. "About Anthology Film Archives". Anthology Film Archives. 2004.
<http://anthologyfilmarchives.org/about/about>

DV, for which it can be quite problematic to find working decks, is simply captured in its native file format via FireWire, which retains a complete version of each tape, with no further compression.

Because of its long history of interviewing filmmakers and having them introduce their works, Anthology Film Archives also has a massive backlog of audiotape. Analog tape formats are digitized to 96kHz, 24-bit uncompressed WAV files, which are in turn made into 44.1kHz, 16-bit MP3 files for access.

Every file created at Anthology is 'bagged'. That is, they are run through the BagIt File Packaging Format structure. This generates checksums and determines which folder each file goes into. Files are copied to Anthology's server via UNIX command line, and validated upon ingest.[44]

Although it has yet to launch, Anthology Film Archives' use of digital storage is impressive and very well planned. The long development process will surely be worth it, as this is a truly independent video streaming service. The only warning they should heed is that there could be a great influx of traffic to their site, since this has been hotly anticipated for some time. With such an abundance of content to be made available, they may want to look to another organization for whom abundance and popularity became a problem.

Case Study Three: Europeana

> "The heritage of European libraries is one of richness and diversity without equal. It expresses the universality of a continent, which, throughout its history, has held a dialogue with the rest of the world. Therefore, if it is not digitized and made accessible online, this heritage may not in the future occupy its rightful place in world knowledge.
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> This is the reason that we wish to build on the digitization efforts already undertaken by a number of European libraries to put them online so that anyone could access a digitized European library."[45]

Launched in 2008, Europeana is a massive, multi-faceted web portal, linking to hundreds of interlocked websites, and serves as a virtual library of Europe's cultural heritage. In 2005, Jacques Chirac, then-President of France, along with the leaders of Germany, Italy, Spain, Hungary and Poland, sent a letter (excerpted above) to Jose Manuel Durao Barroso, the President of the European Commission pledging their support to the undertaking that would become Europeana[46].

The portal makes accessible online millions of paintings, books, pictures, and films. The website's launch on November 20, 2008 was fraught with problems. It

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[44] This entire section came from email correspondence with Erik Piil.

[45] Multiple Authors. "Letter to President Jose Manuel Durao Barroso" April 28, 2005.
    <http://ec.europa.eu/information_society/activities/digital_libraries/doc/letter_1/index_en.htm>

[46] Author Unlisted. "Digital Agenda for Europe - European Commission". May 10, 2012.
    <http://ec.europa.eu/digital-agenda/en/europeana-background-digitisation-initiative>

crashed within 24 hours of its activation, due to the enormous influx of traffic, with about 13 million hits per hour during peak times[47]. It had to be re-tooled and re-opened several months later to handle its popularity[48].

Copyright, and the concept of orphaned works, has been a major issue for the Europeana project as a whole. Europeana and its affiliates are very careful about displaying copyrighted works, and clear all the necessary legal hurdles in order to show them[49]. Some organizations even have Europeana digitize copyrighted material that can't be publicly displayed, just so that there is a back-up or digital version somewhere that they can access upon request[50].

Europeana's video content raises some concern. Since it is a portal, it is actually compiling content from partner websites. Streaming versions of the video content is compatible with Flash-based FLV or H.264. Quality is a very big issue. Only low-bitrate (1000-1500kbps for most of the affiliate sites), low-quality copies are available for download, with the master files kept elsewhere[51].

The advantage of Europeana over many organizations is that it is extremely well funded, with connections to most of Europe's most prestigious art collections. With this funding and support, they have been able to greatly expand on their initial goals, and much of the money has been used to support the affiliate websites, meaning there are still ongoing preservation and access projects[52].

Conclusion

The three organizations profiled above give us a look at divergent strategies and tactics used to meet the challenges in digitizing obsolete formats and providing online access to their collections. XFR STN represents a high water mark not only for online access, but also for DIY preservation. They have embraced the 'lots of copies keeps stuff safe' model, in that any patron can download and keep these high-quality files should the worst happen to the originals. Their clever use of Internet Archive means that preservation quality files are within reach of anyone with a fast broadband connection and a little patience.

XFR STN had the luxury of a tightly focused scope. It is not quite fair to compare the ambitious aims of Anthology Film Archives and Europeana to XFR STN. The time and funding necessary to replicate what the New Museum did would likely be prohibitive for these two organizations.

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[47] Blair, Colm. "European Online Library Crashes" BBC News. November 21, 2008
           <http://news.bbc.co.uk/2/hi/7742390.stm>

[48] Author Unlsited. "Europeana Reopens". Digital Trends. December 26, 2008.
           <http://www.digitaltrends.com/international/europeana-reopens/>

[49] Markovich, Reka. "Orphan Works, Copyright, and the Public Domain". Europeana Connect. July 19, 2010
           <http://www.europeanaconnect.eu/news.php?area=News&pag=46>

[50] Ornsby. July 2013.

[51] Ornsby, Andrew. "How to Aggregate and Enrich Television Content" July 2013. EUScreen Blog.
           <http://blog.euscreen.eu/?p=3981>

[52] It is interesting to contrast the funding and enthusiasm at a international level shown for Europeana to the U.S. While Europeana is actually expanding beyond its original goals, our own Library of Congress is chronically underfunded.

Europeana deserves tremendous credit for the vast amount of material that it has made available. However, they do run the risk of the ever-present threats of physical degradation, natural disaster, obsolescence of playback devices, and changing formats. (This of course is true for any organization that distributes online video.) This problem is compounded for Europeana as their master files are distributed across more than one hundred partner sites. In a worst-case scenario, the master files could degrade and technological changes could render the access files unusable or sub-optimal[53]. However, given the strength of their funding thus far, it is reasonable to hope that Europeana will be able to keep up with changing technology and will be able to progressively improve the quality of their access copies and effectively monitor and preserve the distributed master files.

The jury is still out on Anthology Film Archives, as their project is not due for completion until spring of 2014. Unlike Europeana, there is only a single repository to deal with, greatly simplifying preservation and physical degradation issues. For example, we do know that everything that is put onto their website is already professionally preserved and backed up elsewhere. We do not yet know what the quality of the video access copies will be. However, the high quality of the audio mentioned above is encouraging.

At present, the issues facing online video access are daunting.[54] Most cultural organizations are generally underfunded, and they will have to continue to make critical decisions about the formats and codecs they can reasonably support. Even though H.264 itself and most of its derivative codecs are patented and copyrighted (and therefore subject to use restrictions) it should remain the format of choice for organizations seeking to provide online access to video.

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[53] Europeana affiliates use some Apple-copyrighted codecs on their videos, such as MPEG-4 Part 2, and the .mp4 format.

[54] There is also the fear of 'patent trolling', that is to say, a codec or format could gain foothold, only for the copyright holder to hand everyone using it a C&D.

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