ASSOCIATION OF NOVA SCOTIA MUSEUMS

# GUIDE TO DIGITIZING TIME BASED MEDIA

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*What is digitization?*

Digitization is the process of converting analog material into digital copies for the purpose of preservation and access.

*What is Time Based Media?*

Time Based Media (TBM) is content that has a temporal aspect such as film, video, sound, and software. The full content is revealed over time as the media is played.

*Why should we digitize?*

Because analog multimedia is highly susceptible to degradation, corruption, and loss of access due to obsolescence, digitization of the content should be undertaken to preserve the content of these types of media in order to preserve their heritage value. As playback equipment becomes obsolete and the tapes, records, etc. themselves become damaged, we risk losing the information contained there.

*Ethical considerations*

When we begin digitizing audio and video, one of the benefits to doing so is increasing access to this information to the communities we serve. With increased access, however, comes an increasing need to consider the ethical nature of releasing sensitive information to the public and how to manage that information when it is deemed unethical to do so.

**Digitization**

The limiting factor of any analog digitization project is access to playback equipment, especially if you have a varied collection. The digital end of the workflow should be fairly standard – you can likely use the same software to digitize cassettes, records, and other audio

sources. But you will need equipment that can play each type of media on the analog end in order to digitize, which means cassette players, turntables, reel-to-reel players, etc. If you have many different types of media in your collection, you will need to prioritize your digitization schedule and budget. Things to consider while prioritizing are not only the costs of playing equipment, but their availability. Turntables right now are fairly trendy and can be found inexpensively. Cassette players may be more difficult to find and therefore more expensive. Budget-wise, tackling records first might make sense. But if you prioritize a turntable over a cassette player, you run the risk of cassette players getting even rarer and more expensive during the elapsed time. It may be more reasonable to prioritize digitizing cassettes while there are more players available, since you can reasonably deduce that due to their current trendiness, turntables will be easier to find in the next two, three, or more years.

It may not be necessary to digitize all your time-based media, especially if there are musical albums or films in your collection that are readily available in a digital format already. However, if you have rare or unique recordings, you should consider digitization.

### ***Digitizing Audio***

The digital end of the audio digitizing process is largely the same for most of the types of media you are digitizing. Therefore, with the exception of the Wax Cylinders, the next sections will describe the setup process for each type of media (vinyl record, cassette, etc.), followed by instructions for running the software, which will be the same system for all formats.

#### *Wax Cylinders*

If you have wax cylinders that you would like to digitize, consider making contact with the University of California Santa Barbara, which maintains “a digital collection of more than

10,000 cylinder recordings held by the UCSB Library. To bring these recordings to a wider audience, the Library makes them available to download or stream online for free." (UCSB).

The UCSB cylinder project website describes their technique for digitization as follows:

> "Cylinders were transferred using a French-made Archeophone, using custom Shure styli from Expert Stylus in England. The audio was converted from analog to digital using a CEDAR ADA (through 2014) or Prism ADA (after 2014) and captured at 44.1 kHz with a bit depth of 24 bits in Steinberg Wavelab software running on a PC. Starting in 2014, raw files were captured at 24 bits and 96 kHz. Files were edited and normalized and then processed with CEDAR's Series X and Series X+ Declicker, Decrackler, Dehisser, and Debuzzer units. […] After 2009, cylinder transfers have been captured simultaneously as raw and processed wav files by splitting the digital signal, routing one channel through the CEDAR/Prism components and recombining them and capturing simultaneously on the DAW as two mono wav files."[1]

While the UCSB Library takes donations of cylinders to further facilitate this digitization project, digitizing your own cylinders is more complicated, mainly because the Archeophone described above, a specially made universal cylinder player, is prohibitively expensive (one listing was found at $29,250), making it is not truly feasible for small museums to digitize their own wax cylinders. It is recommended to outsource this service if financially possible. Musical cylinders may already have the audio digitized by another institution, such as UCSB. If this is the case, it may not be a priority to digitize that audio. However, personal and otherwise unique recordings should be taken into consideration as a digitization priority. There are companies that can provide digitization services for wax cylinders (see resources), and if your collection

[1] University of California, Santa Barbara. "Cylinder Preservation and Digitization Project." Overview | UCSB Cylinder Audio Archive. University of California, Santa Barbara. Library. Department of Special Collections., November 16, 2005. http://cylinders.library.ucsb.edu/overview.php.

contains many unique recordings of this type, acquiring funding for this project would be recommended.

*Vinyl Records*

To digitize vinyl records, you will need a turntable or record player and stereo device. The simplest way to do this would be with a modern record player with an integrated USB output. If your stereo device does not have a built-in phono input, you will also need a phono preamplifier. A combination phono pre-amp and USB analog-digital converter, a modern device that makes converting from analog to digital much simpler, can also be used. You will also need the correct cables to connect the record player to the computer through which you will be digitizing. These should connect the recording outputs on the pre-amp to the line-in on the computer. You will need to check your equipment specifically to see what you will need.

Finally, you will need software that will let you record the audio to a digital file. Audacity is free, open-source software that can meet this need.

Before digitizing vinyl records, ensure they are clean and free of dust, debris, and other grime. This will ensure that your digital files will be as clear sounding as possible. See the resources section below for guidelines on the care and cleaning of these materials.

*Audio Cassette Tapes*

To digitize cassette tapes, you will need a tape deck and a 1/8 inch stereo audio cord to connect the tape deck to the line-in on the computer. The tape deck can be as simple as a portable

cassette recorder. CHIN recommends setting your computer system preferences to about 75% sound level for Input volume.[2]

Before digitization, ensure that the tapes are clean and free of dust, debris, mould, or grime. Ensure that the tape is in good condition for playing, and is not stretched or sagging. Proper storage conditions can ensure that these concerns are reduced. CCI has recommendations for cleaning and care of audio cassettes. Additionally, ensure that the tape deck itself is also clean. The head that runs along the tape should be dust and debris free (see resources).

*Reel-to-Reel Tape*

To digitize reel-to-reel tape, you will need a reel-to-reel player, a stereo cable, and a Y-adapter to condense the stereo signals to a single stereo plug that can plug into the recording jack on the computer. The tape should be set up on the left spindle of the player and threaded through to the take up-spool on the right spindle.[3] Refer to the manual for your reel-to-reel player to ensure you are threading the tape properly, and always handle the tape with care, avoiding getting the oils from your hands on the tape. If your player does not come with the original manual, there are tutorial videos on websites like YouTube that can help walk you through this process.

*The Process*

When you are ready and your equipment is plugged into your computer, launch your software. This guide will move forward using Audacity as the software of choice, due to its

[2] MANL. "Digitizing Intangible Cultural Heritage 2017.

[3] Clark, James. "How to Record Into a Computer From a Reel-to-Reel Tape Recorder." Techwalla. Accessed November 12, 2019. https://www.techwalla.com/articles/how-to-record-into-a-computer-from-a-reel-to-reel-tape-recorder.

being free. If you are using other software, you will need to adjust the following instructions accordingly. Most popular software will have how-to videos on websites like YouTube that can walk you through the steps for most of their functions. In Audacity, you will need to set your recording input. For records, under System Preferences as "Line In" before continuing. For a tape deck, set to "Built-in Output and Built-in Input. You may need to set your computer's input source as well in your computer's settings.

Digital Trends recommends recording "at a minimum of 16 bits sampled at 44.1kHz,"[4] which can be accomplished with the free Audacity software mentioned above and in the resources section. This will create a high quality master file that you can compress for sharing if needed, rather than having to record again at a higher quality later.

It is important to make sure your sound levels are not too high (this will result in "clipping", a rough sound in the audio) or too low. Audacity will indicate the sound levels in the Input Level Meter, and you can adjust accordingly.

Once your settings are correctly adjusted and you are ready to digitize, select record in the software and begin playing your audio on your playback device. You will need to let the entirety of what you want digitized play out in real time. Because of this, this process can take a lot of time, especially if you have many artifacts to digitize. Prioritizing your digitization schedule is key to ensuring the most valuable content is digitized first.

With musical records especially, you choose to split the tracks into individual files, but this is not a requirement. To do so, you will need to highlight the area of sound for that track, and

[4] Hall, Parker. "Keep Those Albums Sounding Great by Converting Your Vinyl to a Digital Format." Digital Trends. Digital Trends, April 15, 2019. https://www.digitaltrends.com/home-theater/how-to-convert-vinyl-to-digital/

then going through the Tracks menu, "Add Label At Selection" and name the track appropriately.

Once your tracks are labelled and your file is ready, you will need to export the digitized audio by selecting "Export Multiple." Once you have selected your file format, you can add in metadata and then Export.

CHIN recommends always working with .WAV files. .WAV files are lossless, which means that when you save the file, the computer does not compress it and discard data, which happens with MP3 and WMA files. Over time, the compression causes degradation of the file. You can use these other formats, which are smaller, for sharing your files through your database, etc., but your master files should always be saved in a lossless format.[5]

*Digitizing Video*

*Film Reels*

There are products on the market that are made for digitizing film reels, such as the film scanners available from manufacturers like Wolverine or Winait, which can digitize 8mm and Super 8 film reels (see resources for more information)[6]. These are in the mid-hundreds for cost, depending on where you look online, and so they may not be feasible for a small-scale digitization project. There are also companies that provide this service, such as Costco[7]. Depending on the size of the collection of film reels to be digitized, this could be a feasible option. The needs and priorities of your digitization project will determine if that is the case.

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[5] MANL. "Digitizing Intangible Cultural Heritage 2017.

[6] Murphy, Laura. "How to Convert Film and VHS to Digital." Consumer Reports. Accessed November 12, 2019. https://www.consumerreports.org/audio-video/how-to-convert-film-and-vhs-to-digital/.

[7] Costco. "Photo Centre Promo." Costco. Accessed November 12, 2019. https://www.costco.ca/photo-centre-promo.html .

Another method, described by industry expert Elias Arias, but which is not recommended, involves projecting the film with a projector onto a very clean white wall or projector screen, and filming the projection digitally. This method creates a large margin for error as if the projection surface is not very clean and smooth or if there is any off-white tone, and if there are any lighting shifts, etc, it can affect the resulting digital copy of the video[8].

*VHS and MiniDV*

When digitizing video in VHS or MiniDV format, there isn't a standard free software that crosses platforms, so you will need to select the correct software depending on if you are using a Windows PC or a Mac.

Mac users will need:

- VCR player or Camcorder for VHS playback.
- DV Camcorder for MiniDV playback and as a hub to connect a VCR to a computer via a FireWire cable.
- If a DV Camcorder is unavailable, an analog-to-DV converter box will be required.
- A cable to connect VCR to camcorder, and a FireWire with USB end to connect camcorder to computer.
- External hard drive to store large video files.
- iMovie HD

Once the VCR has been attached to the converter/DV camera, and the converter to the computer via the FireWire cable, launch iMovie HD.

Ensure the line-in sound levels on your computer are set to 75%. If it's an option, set input to Digital-in/Optical digital-in port.

Set the camcorder to VTR/Play/VCR mode (depending on device). Switch iMovie to camera mode.

[8] Murphy, Laura. "How to Convert Film and VHS to Digital."

Press play on the VCR and camcorder. Press import in iMovie. When the tape is finished playing, press import again to stop the transfer.

Save and appropriately label the file.

PC users will need:

- VCR or Camcorder
- Video Card that accepts video-in, usually via a 9-pin S-video VIVO port. Ensure that this is a video-*in* port, as some are only video-out.
- 9-pin S-video cable to connect the VCR or camcorder S-video-out port to the video card port, which will ensure better quality video. A traditional RCA connector plug can be used on older equipment without the S-video-out port.
- RCA-to-stereo audio cable with an audio jack at one end (PC end) and either one or two RCA plugs on the other end (VCR end).
- Windows Movie Maker (make sure the software has been updated recently).

Once you have connected the PC to the VCR/Camcorder, launch Windows Movie Maker.

If using a camcorder, set to VTR/Play/VCR mode (depending on device).

In Windows Movie Maker, under File, select "Capture Video". When finished, click "Stop Capture". Save and appropriately label your file.

*Editing*

There may be a need to edit files after digitization has taken place, either to remove sensitive information before making publicly accessible, to make file sizes more manageable, or for exhibition purposes. The master files should *never* be edited. These files should remain as authentic a representation of the original material as possible. Editing copies should be made, and these can also be saved in smaller file types for sharing and streaming, as only the master copies need to be saved in a lossless format.

Editing software will vary depending on the operating system being used, but the free software mentioned in this guide – Audacity, iMovie, Windows Movie Maker – have numerous available tutorial videos online that can help with editing tasks that may be required.

*File Management & Storage*

Always make sure to use a consistent and clear file naming convention in order to maintain an organized file management system. Label edited files as such.

Back up files regularly to protect them from corruption and data loss.

*Resources*


- Audio Restauracion Sound Restoration Labs: Wax Cylinder Digitization Services. https://audiorestauracion.com/wax-cylinder-to-digital/
- Costco: Film reel conversion services. https://www.costco.ca/photo-centre-promo.html
- "Best budget phono preamps for your turntable" https://coloredvinylrecords.com/blog/best-budget-phono-preamps/
- "Care, Handling, and Storage of Audio Visual Materials." Collections Care – Preservation. Library of Congress. https://www.loc.gov/preservation/care/record.html
- "Capture Your Collections 2010 – Small Museum Version." CHIN. https://www.canada.ca/en/heritage-information-network/services/digitization/capture-collections-small-museum.html
- "Digitizing Intangible Cultural Heritage : A How-To Guide." Museum Association of Newfoundland and Labrador, for CHIN. https://www.canada.ca/en/heritage-information-network/services/web-interactive-mobile-technologies/guide-digitizing-intangible-cultural-heritage.html