# Best Practices for Audio Digitization

- Know your equipment!
- Use the shortest possible signal path.
- Record at highest practical resolution (96kHz for music, 48kHz for speech, always 24bit).
- Record at a level that does not distort audio.
- No audio processing (except Normalization to -3dBs).
- Use the .BWF file format (or .WAV).
- Embed minimal, fixed metadata.

What Happens When Analog Audio is Digitized?

Analog audio (represented in the image as the red line) is a continous, uninterrupted wave. When this wave is digitized, samples are taken of this wave at regular intervals (the blue dots). The quality of a digital audio file is largely determined by two factors:

1. How often samples are take of the wave. This is called *sample rate*, and is represented in the image by how many blue dots there are). The sample rate has a major impact on the frequency range (lowest pitch to highest pitch) a digital recording can reproduce. Sample rate is stated as a frequency, such a 44.1kHz or 96kHz.

2. How much information is captured in each sample. This is called *bit depth*, and is shown on the right with the numbers 0-15, meaning this is a 16-bit recording. The bit depth has a major impact on the dynamic range (quietest part to loudest part) a digital recording can reproduce. Bit depth is stated as a number of bits, such as 16 bits or 24 bits.

Sample rate and bit depth each have an impact on file size. The more samples that are made to represent a sound, the larger the file will be. And the more bits that are used to represent the sound, the larger the file will be, too.
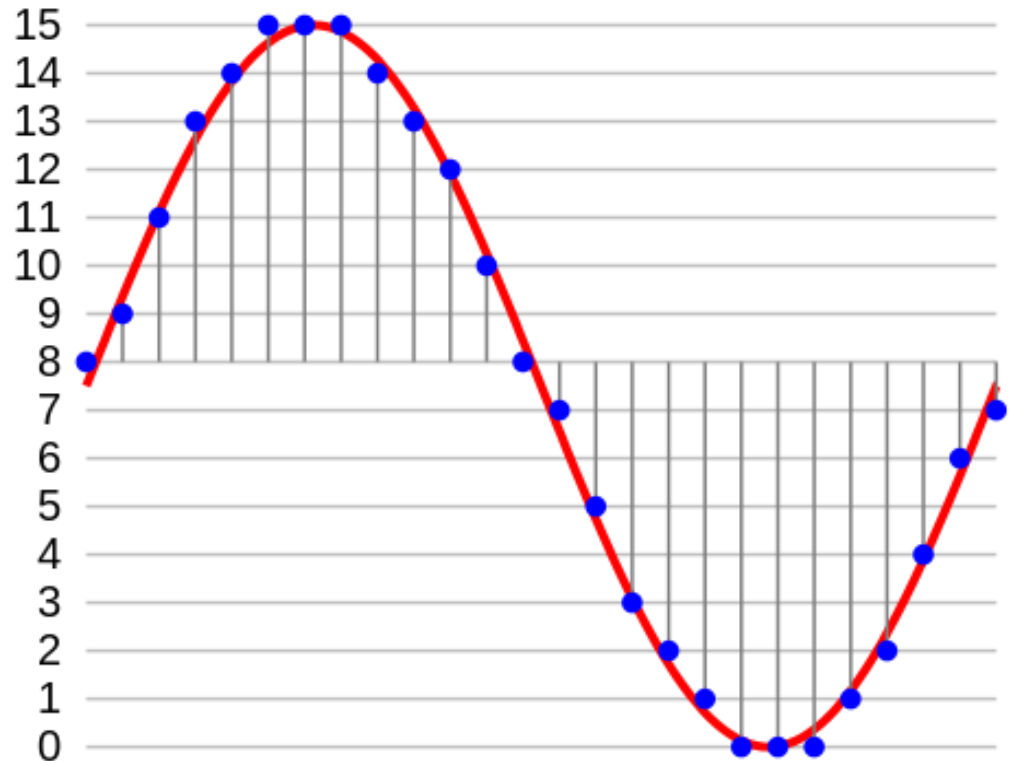
The generally agreed upon standard for preservation audio is:
96kHz / 24 bit
A stereo recording at this sample rate and bit depth will be **2GB**.
This standard was created for audio of musical performances, which may include instruments that perform at frequencies higher than spoken human voices. Recordings of speech may be digitized at 48kHz/24bit. This captures a high quality reproduction while taking up less digital storage.

Digital audio recordings made for preservation should never be "improved" through processing like noise reduction or click removal. Such processing should only be applied to access surrogates. The only acceptable processing for preservation recordings is to Normalize all recordings to the same maximum loudness.