

The Wacky World of Codecs

TFM 327-627

What is a Codec

- Compressor / Decompressor

Video Production Codecs

- Often referred to as 'format'

- AVCHD

- H.264/265

- X-AVC

- Apple ProRes 422/444/HQ

- "Raw" formats

- BlackMagic Raw

- Canon Raw / Lite

- Arri Raw

- Redcode

- Apple ProRes Raw

Other Codecs

- MPEG-2 (video)
 - used in DVD, HD broadcast, digital cable
 - XDCam HD uses Mpeg-2 (high bit rate)
- MPEG-3 (mp3)
 - audio codec
 - most common audio codec pre 2010s

Other Codecs

- AAC (audio)
 - audio codec, used in iTunes music store and mp4 streams
- MPEG-4 (all variants, video)
 - Blu Ray codec
 - Dominant internet video codec, Used in iPods, AppleTV, cellphones
 - Used in DSLR, camcorders

Other Codecs

- AVCHD / AVCHD-Lite
 - Based on Mpeg-4
 - Used in low/mid-end DSLR video production, many camcorders,
 - 17-24 Mb/sec
 - 8-bit

File Containers

- Quicktime Files
 - “.mov” extension
 - Contains codec data
- MXF Files
 - “.mxf” extension
 - Open standard

File Containers

File Container
(.mov, .mxf, .mp4)

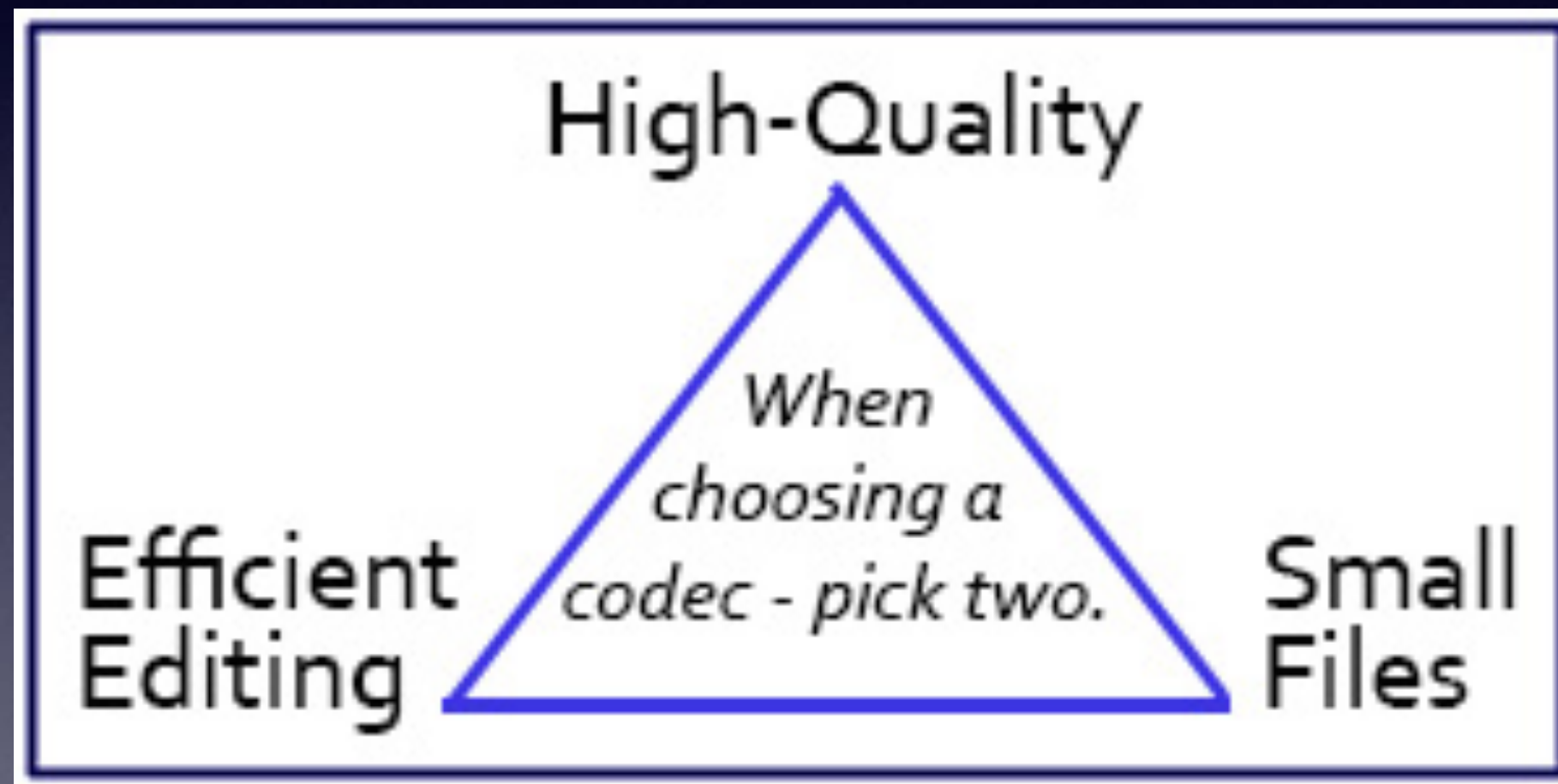
Audio
Codec

Video
Codec

Metadata (timecode, scene, take, etc.)

The diagram illustrates the structure of a file container. It features a yellow background. At the top, the text 'File Container' is written in blue, with '(.mov, .mxf, .mp4)' in a smaller blue font below it. In the center, there are two colored rectangles: a green one on the left labeled 'Audio Codec' and a blue one on the right labeled 'Video Codec'. At the bottom, a large pink double-headed arrow spans the width of the container, with the text 'Metadata (timecode, scene, take, etc.)' centered inside it.

Camera codec vs. Editing codec



Camera format



- Arri Alexa
- ProRes
- ArriRAW

Camera format



- Panasonic GH5/6
 - AVC-Intra
 - AVC-LongGOP

Camera format



- Sony A7x series
 - XAVC 10bit
 - AVCHD

Camera format



- Blackmagic series
 - BRAV
 - ProRes

Camera format



- Sony FS7
 - XAVC Intra
 - ProRes 422

Camera format



- Canon C300 series
- XF-AVC

Camera format vs. Intermediate codec

- What do I use for my project settings?
- Compressed codecs can be hard to playback on common PCs
 - Transcode to “Editing” Codec or “Mezzanine” Codec
 - Transcode to Proxies (smaller brethren)

Camera format vs. Intermediate codec

- Mezzanine or Intermediate Codecs
- Apple ProRes (most common)
 - ProRes 4444 XQ
 - ProRes 4444
 - ProRes 422HQ
 - ProRes 422
 - ProRes 422LT
 - ProRes 422 Proxy
- Other Mezzanine Codecs
 - DNx (Avid)
 - CineForm (GoPro)

Camera format vs. Intermediate codec



- Why transcode to Mezzanine Codecs?
 - Lower CPU overhead
 - Easier video scrubbing on timeline/ playback
 - Less generation loss
 - Smart Rendering
 - Proxy workflow

8 bit vs. 10 bit

- Video made of digital bits.
- 8 bits per color channel per pixel = 256 values per channel/pixel
- 10 bits = 1024 values per channel
- Some raw codecs use up to 16 bits/pixel.

8 bit vs. 10 bit

8 Bit

Possible shade values per channel

256 x 256 x 256



16,777,216
Possible Colors



10 Bit

Possible shade values per channel

1,024 x 1,024 x 1,024



1,073,741,824
Possible Colors



12 Bit

Possible shade values per channel

4,096 x 4,096 x 4,096



Over 68 Billion
Possible Colors





8-bit video



10-bit video

(Somewhat Exaggerated)

8 bit vs. 10 bit

- Most consumer/prosumer codecs use 8 bits
 - DV/DVCPProHD = 8 bit
 - HDCam = 8 bit
- Higher-end production codecs use 10 bits
 - Sony / Canon XAVC
 - Apple ProRes
 - Avid

8 bit vs. 10 bit

- Most production still in 8 bits
- More bits = higher data rate
- 10 bit quality imperceptible to most
 - 10 bit good for
 - high-end VFX
 - high-end color grading
 - film scanning/processing

8 bit vs. 10 bit

- Most consumer distribution still in 8 bits...
 - DVD
 - Blu-Ray
 - iTunes
 - NetFlix
 - Amazon Prime Video
 - YouTube