

Embedded Metadata (in WAVE Files)



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MUSIC LIBRARY ASSOCIATION 2011, PHILADELPHIA
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**AUDIOVISUAL
PRESERVATION
SOLUTIONS**

What Does Embedded Metadata Mean?



Metadata that is stored inside the same file, or container that also stores the audiovisual essence to which the metadata refers

Why Embed?



The Government says it's good for you. Or at least for them.

<http://www.digitizationguidelines.gov/guidelines/digitize-embedding.html>

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Federal Agencies
Digitization Guidelines Initiative

[Your Comments](#)

Submit comments on guidelines or on our digitization efforts in general.

Guidelines: Embedding Metadata in Broadcast WAVE Files

Audio-Visual Working Group

The Working Group has developed the *BWF MetaEdit* tool to support users of the specification, as well as providing other functionality for work with WAVE and Broadcast WAVE files. Information about the tool is provided below.

Specification: Current Version

[Broadcast WAVE Metadata](#) (PDF, 121KB)

Approved by Working Group – September 15, 2009

Specification: Background

The draft guideline on Broadcast WAVE Metadata represents a minimal set of embedded metadata for historical and cultural heritage digital audio reformatting. The two documents below offer an explanatory context for the guideline and describe the constraints imposed by existing WAVE metadata structures. The Working Group plans to develop a guideline encompassing richer metadata and a more flexible structure in the future.

- [Introductory discussion](#) (PDF, 74 KB) for the proposed audio metadata embedding guideline
- [Consultant's report on embedding options](#) (PDF, 319 KB) in digital audio files

Working Groups

[Still Image Working Group](#)

This group is involved in a cooperative effort to develop common digitization guidelines for still image materials.

[Audio-Visual Working Group](#)

The goal for this working group is to identify, establish, and disseminate information about standards and practices for the digital reformatting of audio-visual materials by federal agencies.



MLA 2011, Philadelphia | February 10, 2011

Why Embed?



- **Everyone else is doing it!**
 - Recorders and Cameras –Creation
 - Software Applications & Editing Systems –Editing
 - Asset Management and Workflow Systems - Management
 - Distribution Platforms – Distribution and Access
- **Filename dependencies are a nasty habit**

Why Embed?

Or is that even the right question?



- **Everyone else is doing it!**
 - Recorders and Cameras –Creation
 - Software Applications & Editing Systems –Editing
 - Asset Management and Workflow Systems - Management
 - Distribution Platforms – Distribution and Access
- **Filename dependencies are a nasty habit**
- **It exists in files, it is integral and it is useful**
- **To ignore it is to effectively de-catalog**

Importance to Archives



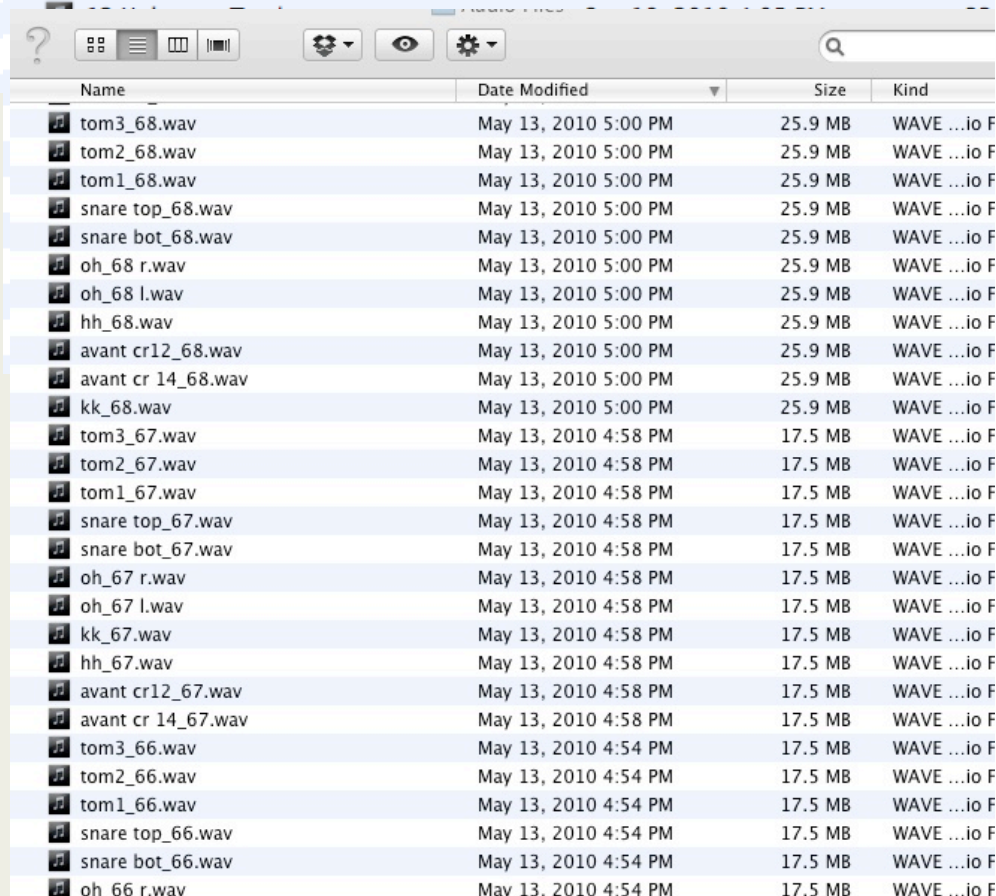
- Authenticity and Integrity
- Management
- Identification and Description
- Workflow
- Redundancy and Backup

09 Unknown Track.wav	Sep 19, 2010 4:04 PM
10 Unknown Track.wav	Sep 19, 2010 4:04 PM
11 Unknown Track.wav	Sep 19, 2010 4:04 PM
12 Unknown Track.wav	Sep 19, 2010 4:05 PM
13 Unknown Track.wav	Sep 19, 2010 4:05 PM
14 Unknown Track.wav	Sep 19, 2010 4:05 PM
15 Unknown Track.wav	Sep 19, 2010 4:05 PM
16 Unknown Track.wav	Sep 19, 2010 4:05 PM
17 Unknown Track.wav	Sep 19, 2010 4:06 PM
18 Unknown Track.wav	Sep 19, 2010 4:06 PM
19 Unknown Track.wav	Sep 19, 2010 4:06 PM
20 Unknown Track.wav	Sep 19, 2010 4:06 PM

01 Unknown Track.wav	Sep 19, 2010 4:02 PM	49.
02 Unknown Track.wav	Sep 19, 2010 4:02 PM	3
03 Unknown Track.wav	Sep 19, 2010 4:02 PM	46.
04 Unknown Track.wav	Sep 19, 2010 4:03 PM	40.
05 Unknown Track.wav	Sep 19, 2010 4:03 PM	29.
06 Unknown Track.wav	Sep 19, 2010 4:03 PM	41.
07 Unknown Track.wav	Sep 19, 2010 4:03 PM	41.
08 Unknown Track.wav	Sep 19, 2010 4:04 PM	35.
09 Unknown Track.wav	Sep 19, 2010 4:04 PM	34.
10 Unknown Track.wav	Sep 19, 2010 4:04 PM	49.
11 Unknown Track.wav	Sep 19, 2010 4:04 PM	54.

File Not Found/ The Record Industry's Digital Storage Crisis **Rolling Stone, December 2010**

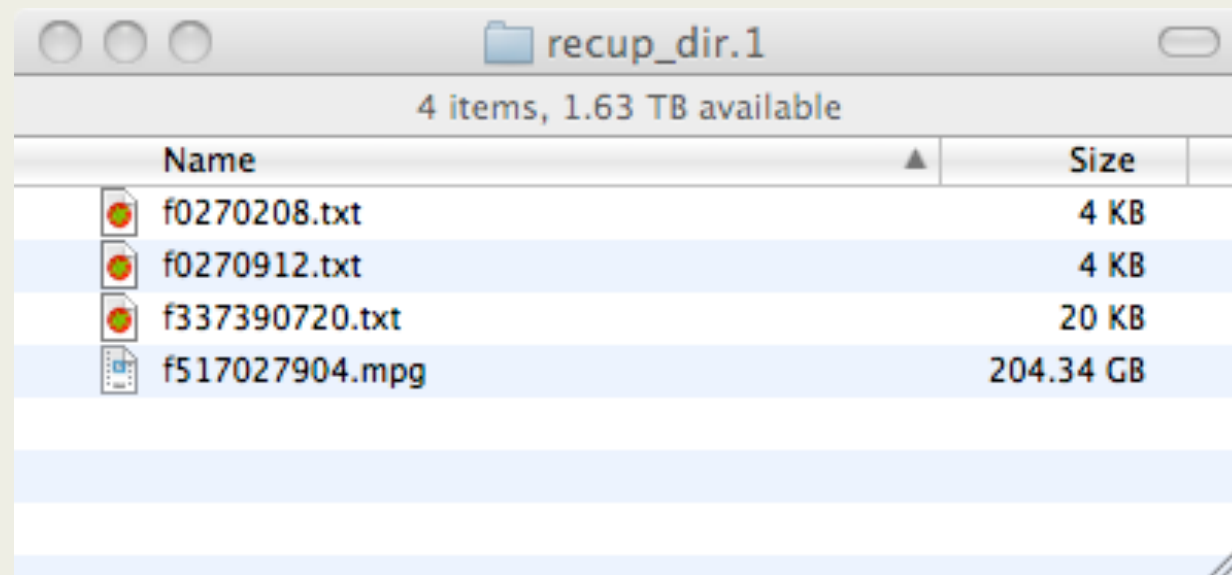
“Label archivists tell horror stories about receiving hard drives that are blank or filled with unidentified files. "You'll get a drive with thousands of files on it," says Chris Lacinak of AudioVisual Preservation Solutions, which has helped preserve music for the Rock and Roll Hall of Fame. “



Name	Date Modified	Size	Kind
tom3_68.wav	May 13, 2010 5:00 PM	25.9 MB	WAVE ...io F
tom2_68.wav	May 13, 2010 5:00 PM	25.9 MB	WAVE ...io F
tom1_68.wav	May 13, 2010 5:00 PM	25.9 MB	WAVE ...io F
snare top_68.wav	May 13, 2010 5:00 PM	25.9 MB	WAVE ...io F
snare bot_68.wav	May 13, 2010 5:00 PM	25.9 MB	WAVE ...io F
oh_68 r.wav	May 13, 2010 5:00 PM	25.9 MB	WAVE ...io F
oh_68 l.wav	May 13, 2010 5:00 PM	25.9 MB	WAVE ...io F
hh_68.wav	May 13, 2010 5:00 PM	25.9 MB	WAVE ...io F
avant cr12_68.wav	May 13, 2010 5:00 PM	25.9 MB	WAVE ...io F
avant cr 14_68.wav	May 13, 2010 5:00 PM	25.9 MB	WAVE ...io F
kk_68.wav	May 13, 2010 5:00 PM	25.9 MB	WAVE ...io F
tom3_67.wav	May 13, 2010 4:58 PM	17.5 MB	WAVE ...io F
tom2_67.wav	May 13, 2010 4:58 PM	17.5 MB	WAVE ...io F
tom1_67.wav	May 13, 2010 4:58 PM	17.5 MB	WAVE ...io F
snare top_67.wav	May 13, 2010 4:58 PM	17.5 MB	WAVE ...io F
snare bot_67.wav	May 13, 2010 4:58 PM	17.5 MB	WAVE ...io F
oh_67 r.wav	May 13, 2010 4:58 PM	17.5 MB	WAVE ...io F
oh_67 l.wav	May 13, 2010 4:58 PM	17.5 MB	WAVE ...io F
kk_67.wav	May 13, 2010 4:58 PM	17.5 MB	WAVE ...io F
hh_67.wav	May 13, 2010 4:58 PM	17.5 MB	WAVE ...io F
avant cr12_67.wav	May 13, 2010 4:58 PM	17.5 MB	WAVE ...io F
avant cr 14_67.wav	May 13, 2010 4:58 PM	17.5 MB	WAVE ...io F
tom3_66.wav	May 13, 2010 4:54 PM	17.5 MB	WAVE ...io F
tom2_66.wav	May 13, 2010 4:54 PM	17.5 MB	WAVE ...io F
tom1_66.wav	May 13, 2010 4:54 PM	17.5 MB	WAVE ...io F
snare top_66.wav	May 13, 2010 4:54 PM	17.5 MB	WAVE ...io F
snare bot_66.wav	May 13, 2010 4:54 PM	17.5 MB	WAVE ...io F
oh_66 r.wav	May 13, 2010 4:54 PM	17.5 MB	WAVE ...io F

Avoiding Filename Dependencies

- Filename not embedded
- Disaster Recovery
- Inadvertent changes across operating systems



A screenshot of a macOS file browser window titled "recup_dir.1". The window shows a list of 4 items with a total of 1.63 TB available. The list is as follows:

Name	Size
f0270208.txt	4 KB
f0270912.txt	4 KB
f337390720.txt	20 KB
f517027904.mpg	204.34 GB

Importance to



- End-users
- Production and Post Production
- Creators
- Rights Holders
- Forensics and Legal System

End Users

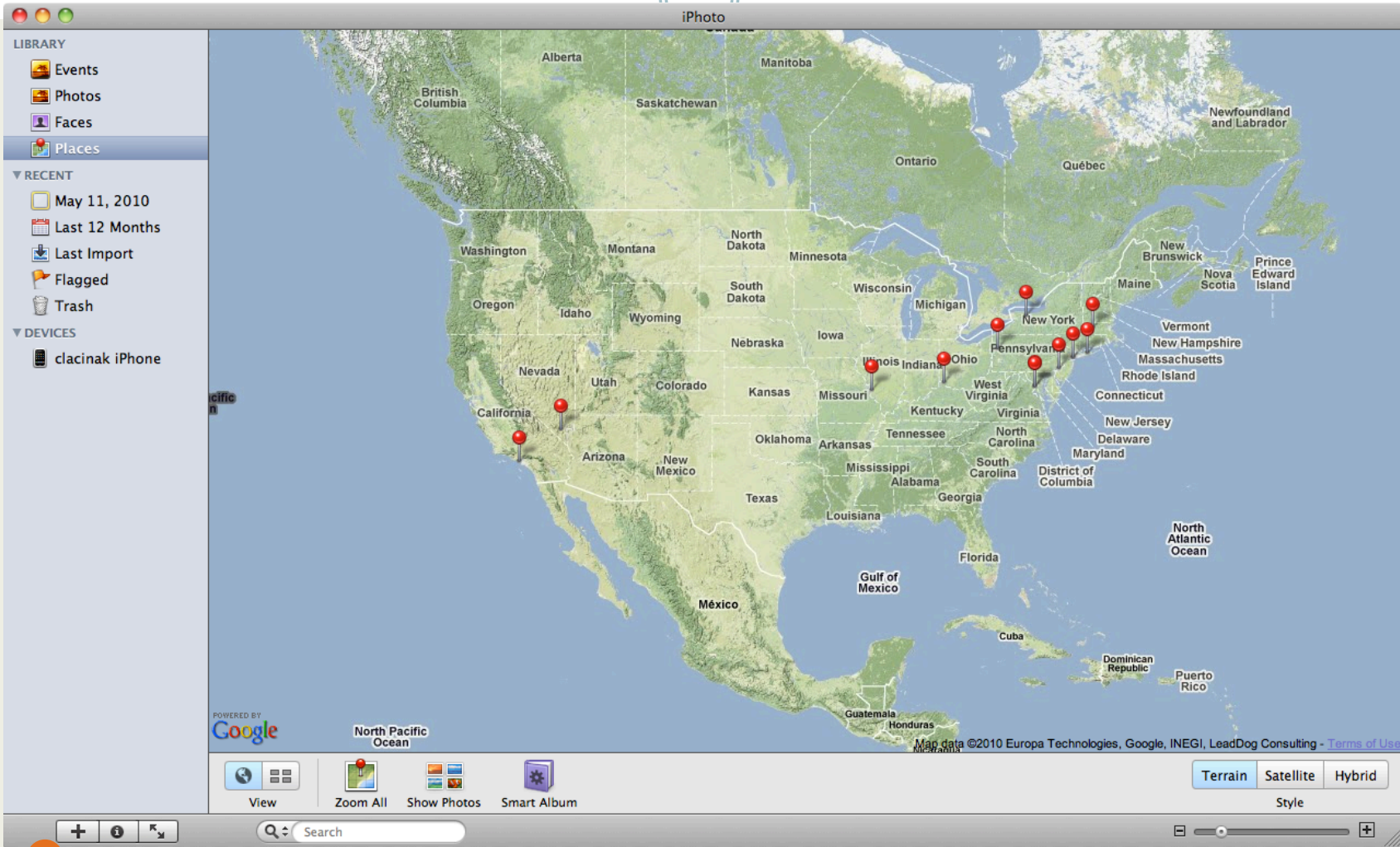
The screenshot shows the iTunes application window with a menu bar (Grab, File, Edit, Capture, Window, Help) and a system status bar (Thu 11:03 PM). The iTunes interface includes a playback control bar at the top, a search bar, and a sidebar with categories like LIBRARY, STORE, DEVICES, SHARED, GENIUS, and PLAYLISTS. The main area displays a table of tracks with columns for Name, Artist, Time, Date Added, Album, Genre, Rating, Play Count, and Last Played. The tracks listed are all named 'File X copy Y' and have a duration of 0:05. A quote is overlaid on the right side of the screenshot, and the source is cited as Rolling Stone 12/2010.

Name	Artist	Time	Date Added	Album	Genre	Rating	Play Count	Last Played
File 3 copy 3		0:05	5/20/10 11:01 PM					
File 3 copy 4		0:05	5/20/10 11:01 PM					
File 3 copy 5		0:05	5/20/10 11:01 PM					
File 4 copy 3		0:05	5/20/10 11:01 PM					
File 4 copy 4		0:05	5/20/10 11:01 PM					
File 4 copy 5		0:05	5/20/10 11:01 PM					
File 5 copy 3		0:05	5/20/10 11:01 PM					
File 5 copy 4		0:05	5/20/10 11:01 PM					
File 5 copy 5		0:05	5/20/10 11:01 PM					
File 6 copy 3		0:04	5/20/10 11:01 PM					
File 6 copy 4		0:04	5/20/10 11:01 PM					
File 6 copy 5		0:04	5/20/10 11:01 PM					
File 7 copy 3		0:05	5/20/10 11:01 PM					
File 7 copy 4		0:05	5/20/10 11:01 PM					
File 7 copy 5		0:05	5/20/10 11:01 PM					
File 9 copy 3		0:05	5/20/10 11:01 PM					
File 9 copy 4		0:05	5/20/10 11:01 PM					
File 9 copy 5		0:05	5/20/10 11:01 PM					
File1 copy 3		0:05	5/20/10 11:01 PM					
File1 copy 4		0:05	5/20/10 11:01 PM					
File1 copy 5		0:05	5/20/10 11:01 PM					
File2 copy 3		0:05	5/20/10 11:01 PM					
File2 copy 4		0:05	5/20/10 11:01 PM					
File2 copy 5		0:05	5/20/10 11:01 PM					
File 3		0:05	5/20/10 10:59 PM					
File 3 copy		0:05	5/20/10 10:59 PM					
File 3 copy 2		0:05	5/20/10 10:59 PM					
File 4		0:05	5/20/10 10:59 PM					
File 4 copy		0:05	5/20/10 10:59 PM					
File 4 copy 2		0:05	5/20/10 10:59 PM					
File 5		0:05	5/20/10 10:59 PM					
File 5 copy		0:05	5/20/10 10:59 PM					
File 5 copy 2		0:05	5/20/10 10:59 PM					
File 6		0:04	5/20/10 10:59 PM					
File 6 copy		0:04	5/20/10 10:59 PM					
File 6 copy 2		0:04	5/20/10 10:59 PM					
File 7		0:05	5/20/10 10:59 PM					
File 7 copy		0:05	5/20/10 10:59 PM					

"Imagine if all the songs in your iTunes library just said 'Track 1' or 'Track 2.' Ten years later, when you want to do a remix or collect outtakes — good luck."

**Rolling Stone
12/2010**

End Users



End Users

February 1, 2011

1. BRIEF DESCRIPTION:

The collection of tapes being r
(234) Hi-8 , consisting of 148
(8) Betacam SP, all NTSC
(15) VHS, all NTSC

The content lengths are unkn
However, you will note that v

The content on these tapes in
to preserve and make accessib
efforts.

Statement of Work Sample.docx Properties

General Summary Statistics Contents Custom

Title: Sample Statement of Work

Subject: Outsourcing Digitization

Author: Chris Lacinak

Manager: Chris Lacinak

Company: AVPS

Category:

Keywords: Sample, Statement of Work, Digitization, Video

Comments: Used as a reference for demonstrating an appropriate level of detail to provide to vendors when outsourcing reformatting.

Hyperlink base: www.avpreserve.com

Template: Normal.dotm

Save preview picture with this document

Cancel OK



Metadata Embedded in Case Law



SUPREME COURT OF ARIZONA
En Banc

DAVID LAKE,)
) Arizona Supreme Court
) No. CV-09-0036-PR
 Plaintiff/Appellant,)
) Court of Appeals
 v.) Division One
) No. 1 CA-CV 07-0415
 CITY OF PHOENIX, a political)
 subdivision of the State of) Maricopa County
 Arizona; FRANK FAIRBANKS, in his) Superior Court
 official capacity; MARIO) No. LC 2006-000835-001 DT
 PANIAGUA, in his official)
 capacity; JACK HARRIS, in his)
 official capacity,)
) **O P I N I O N**
 Defendants/Appellees.)
)
)

Appeal from the Superior Court in Maricopa County
The Honorable Michael D. Jones, Judge



Metadata Embedded in Case Law




B A L E S, Justice

¶ 1 Arizona law provides that “[p]ublic records and other matters in the custody of any officer shall be open to inspection by any person at all times during office hours.” Ariz. Rev. Stat. (“A.R.S.”) § 39-121 (2001). The City of Phoenix denied a public records request for metadata in the electronic version of a public record. We today hold that if a public entity maintains a public record in an electronic format, then the electronic version, including any embedded metadata, is subject to disclosure under our public records laws.



Difference Between This...



.DS_Store	Today
92869753_l.mov	Sep 18
92869753_q.mov	Sep 26
4140461299_160302b871_o.jpeg	May 21
4998910423_04d56f08f7_o	
ARSCMetaTest1.wav	
ARSCMetaTest1alt.wav	
Demo_DV_720x480_CC42.c	
Description Activity.doc	
dvanalyzer_sample...racy_N	

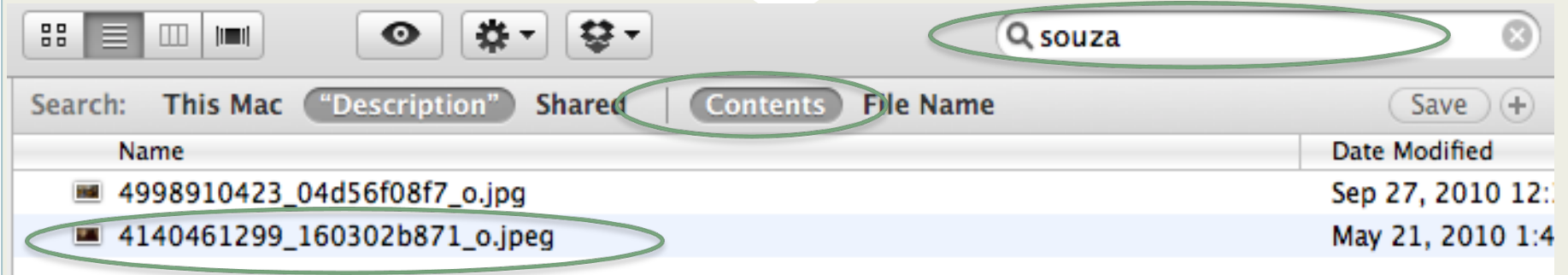


And This – Taking a Look Inside

```
ExifTool Version Number      : 7.85
File Name                    : 4140461299_160302b871_o.jpg
Directory                    : .
File Size                    : 808 kB
File Modification Date/Time   : 2009:12:09 13:09:27-05:00
File Type                    : JPEG
MIME Type                    : image/jpeg
JFIF Version                 : 1.02
Exif Byte Order              : Little-endian (Intel, II)
Image Description            : Aides brief President Barack Obama aboard Air Force One en route to Tokyo, Japan, Nov. 12, 2009. (Official White House Photo by Pete Souza)...This official White House photograph is being made available only for publication by news organizations and/or for personal use printing by the subject(s) of the photograph. The photograph may not be manipulated in any way and may not be used in commercial or political materials, advertisements, emails, products, promotions that in any way suggests approval or endorsement of the President, the First Family, or the White House.
Make                         : Canon
Camera Model Name            : Canon EOS 5D Mark II
Orientation                  : Horizontal (normal)
X Resolution                 : 240
Y Resolution                 : 240
Resolution Unit              : inches
Software                    : Adobe Photoshop CS4 Macintosh
Modify Date                  : 2009:11:25 14:14:24
Artist                      : Pete Souza
Copyright                   : This official White House photograph is be
subject(s) of the photograph. The photograph may not be manipulated in any w
promotions that in any way suggests approval or endorsement of the President
Exposure Time                : 1/125
F Number                    : 2.8
Exposure Program            : Manual
ISO                          : 640
Exif Version                 : 0221
Date/Time Original          : 2009:11:12 19:55:48
Create Date                 : 2009:11:12 19:55:48
Shutter Speed Value         : 1/125
Aperture Value              : 2.8
Exposure Compensation       : 0
Max Aperture Value         : 1.4
Metering Mode               : Partial
Flash                       : Off, Did not fire
Focal Length                : 35.0 mm
Sub Sec Time                : 90
Sub Sec Time Original       : 90
Sub Sec Time Digitized     : 90
```

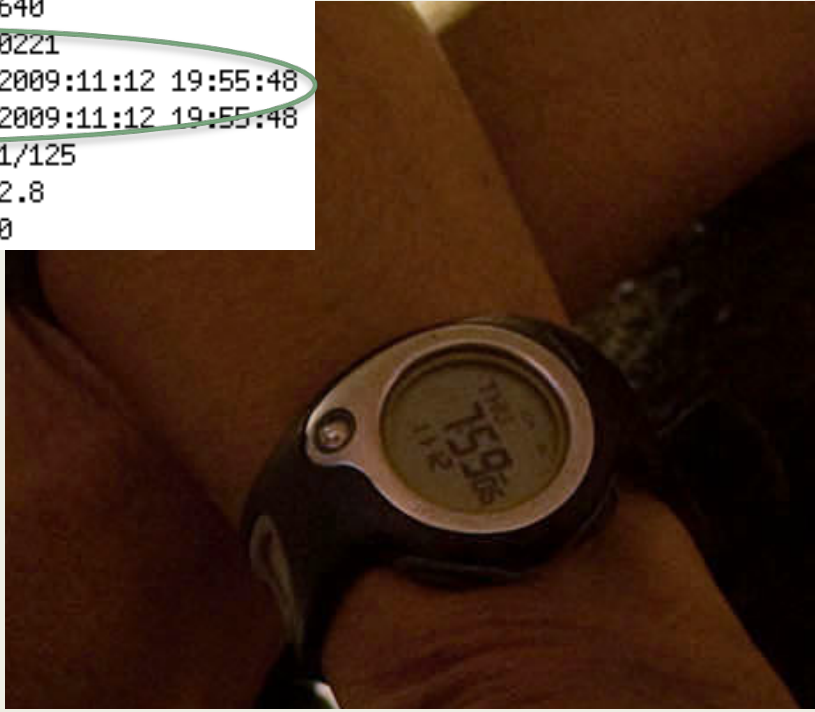


Searching using the Photographer's Name





Exposure Program	: Manual
ISO	: 640
Exif Version	: 0221
Date/Time Original	: 2009:11:12 19:55:48
Create Date	: 2009:11:12 19:55:48
Shutter Speed Value	: 1/125
Aperture Value	: 2.8
Exposure Compensation	: 0



Moving on From Why? to What?



Embedded Metadata in WAVE Files



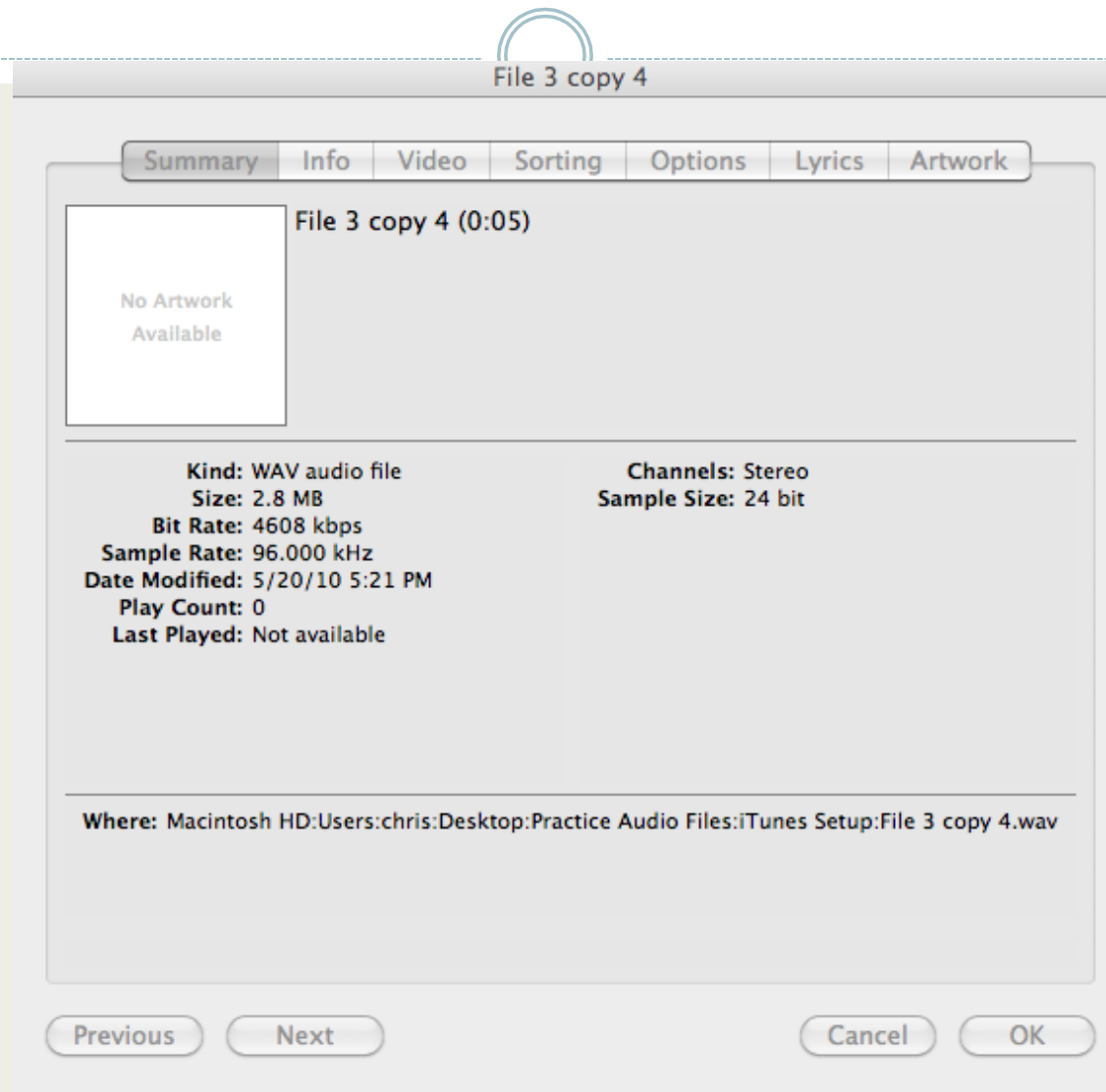
File Structure - Chunks



Location (hex)	Size (hex)	Chunk IDs ----->	
00000000	1112E678	WAVE	
0000000C	00000010	fmt	Format chunk Tech md
00000024	00000082	INFO	
00000030	00000016		INAM
0000004E	0000000E		IART
00000064	0000000E		ISFT
0000007A	00000016		ICRD
00000098	0000000E		ISRF
000000AE	000002F4	bext	Data chunk Audio data
000003AA	00002C46	PAD	
00002FF8	1112B680	data	

File Structure - Chunks

Format Chunk in Use



File Structure - Chunks

Data Chunk in Use



Embedded Metadata Standards

00000000	002CE4AE	WAVE	
0000000C	00000010	fmt	
00000024	00000258	INFO	
00000030	00000022	IARL	LIST-INFO
0000005A	00000017	IART	
0000007A	0000001D	ICMS	
000000A0	00000019	ICMT	
000000C2	0000001A	ICOP	
000000E4	0000001E	ICRD	
0000010A	00000019	IENG	
0000012C	00000016	IGNR	
0000014A	00000019	IKEY	
0000016C	00000017	IMED	
0000018C	0000001D	INAM	
000001B2	00000020	IPRD	
000001DA	00000018	ISBJ	
000001FA	00000019	ISFT	
0000021C	00000017	ISRC	
0000023C	0000001C	ISRF	
00000260	0000001B	ITCH	
00000284	0000DC5B	_PMX	XMP
0000DEE8	00000268	aXML	axml
0000E158	00000DD4	iXML	iXML
0000EF34	0000035A	bext	bext
0000F296	002BF200	data	
002CE49E	00000010	MD5	



ARSC TC Metadata Study



Performed under the auspices of the ARSC
Technical Committee by:



Chris Lacinak and Walter Forsberg

With contributions from:

Tom Endres, BMS/Chace

Tommy Sjöberg, Folkmusiken hus

Bruce Gordon, Harvard University

Preston Cabe, SafeSound Archive



Purpose



- Interoperability related to embedded metadata
- Persistence and Integrity within and across applications
- Primarily focused on end-user audio applications used for recording, editing and playback

Applications Tested



- Wavelab v. 6.10
- Adobe Audition v. 3.0
- Audacity v. 1.3.11
- BIAS Peak v. 5.2.1 & 6.0
- Avid ProTools LE v. 8.0.1
- Apple iTunes v. 9.0.2
- Steinberg Nuendo v. 4.10

Test 1: Interoperability (Display of Embedded Metadata)



- Generate reference file with LIST-INFO, bext, iXML, axml and XMP
- Open in application
- Identify if and how values show up in the interface

Test 1 Results



Chunk	Metadata Field/Tag	Wavelab 6.10	Adobe Audition 3.0	Audacity 1.3.11	BIAS Peak 5.1.2	BIAS Peak 6.0	ProTools LE 8.0.1	iTunes 9.0.2	Nuendo 4.0
BEXT	Description	✓	✓	X	X	✓	✓	X	✓
BEXT	Originator	✓	✓	X	X	✓	X	X	✓
BEXT	OriginatorReference	✓	✓	X	X	✓	~	X	✓
BEXT	OriginationDate	✓	✓	X	X	✓	~	X	✓
BEXT	TimeReference (translated)	✓	✓	X	X	✓	~	X	~
BEXT	TimeReference	✓	✓	X	X	X	X	X	X
BEXT	UMID	X	✓	X	X	✓	X	X	✓
BEXT	Coding History	✓	✓	X	X	X	X	X	✓
LIST-INFO	IARL	X	X	X	X	X	X	X	X
LIST-INFO	IART	✓	✓	✓	X	✓	X	X	X
LIST-INFO	ICMS	X	X	X	X	X	X	X	X
LIST-INFO	ICMT	✓	✓	✓	X	✓	X	X	X
LIST-INFO	ICOP	✓	✓	✓	X	✓	X	X	X
LIST-INFO	ICRD	✓	✓	✓	X	X	X	X	X
LIST-INFO	IENG	✓	✓	X	X	X	X	X	X
LIST-INFO	INGR	✓	✓	X	X	✓	X	X	X
LIST-INFO	IKEY	✓	✓	X	X	X	X	X	X
LIST-INFO	IMED	X	✓	X	X	X	X	X	X
LIST-INFO	INAM	✓	✓	✓	X	✓	X	X	X
LIST-INFO	IPRD	X	✓	X	X	X	X	X	X
LIST-INFO	ISBJ	✓	✓	X	X	X	X	X	X
LIST-INFO	ISFT	✓	✓	✓	X	X	X	X	X
LIST-INFO	ISRC	X	✓	X	X	X	X	X	X
LIST-INFO	ISRF	✓	✓	X	X	X	X	X	X
LIST-INFO	ITCH	X	✓	X	X	X	X	X	X
XMP	All	X	✓	X	X	X	X	X	X
axml	All	X	X	X	X	X	X	X	X
iXML	All	X	X	X	X	X	X	X	X



Test 2: Persistence and Integrity Through Editing Operations



- 4 subtests testing impact of:
 - editing field in existing chunk
 - adding a chunk
 - editing audio and saving
 - Simple “Save As”
- Analyze resulting file for persistence and integrity

Test 2 Result Generalizations & Highlights



- Don't Display = Delete with exception of Audition
 - Within chunks (less exceptions)
 - Entire chunks (more exceptions)
- A couple of apps appended existing data automatically in the bext and iXML chunks
- Differing behaviors between audio edits vs. metadata edits

Test 3: Persistence and Integrity Through Derivative Creation



- Create derivatives – WAVE, MP3 & FLAC
- Analyze persistence and integrity

Test 3: Generalizations and Highlights



- **FLAC Derivative**
 - Almost no applications tested had FLAC encoder
- **WAVE Derivative**
 - From full persistence to best only to full deletion
- **Mapping to MP3 ID3v1 and ID3v2 was variable and pertained only to select LIST-INFO fields**

Overarching Results

Level of “Support”



1. bext
2. Select fields of LIST-INFO
3. Select fields of iXML
4. XMP only by the its creator, Adobe
5. None for axml

Overarching Results



- “Display to Play”
- No consistent display and management across applications
- Or within applications - metadata management differs between versions and between builds
- Some changes need to take place

Next Steps



- Develop Recommendations on metadata support and Guidelines for embedded metadata, handling management and behaviors
- Publish Report, Test Methods and Reference Files
- Advocate for change
 - Within AES and other orgs via TCs, SCs & publications
 - Email campaign to manufacturers
 - With your budgets
 - Other ideas?



BWF MetaEdit

<http://sourceforge.net/projects/bwfmetaedit/>

About BWF MetaEdit



An open-source and freely available tool from the Federal Agencies Digitization Guidelines Initiative (FADGI) developed by AudioVisual Preservation Solutions

<http://sourceforge.net/projects/bwfmetaedit/>

Changes the landscape for how people work with embedded metadata in WAVE files



About BWF MetaEdit



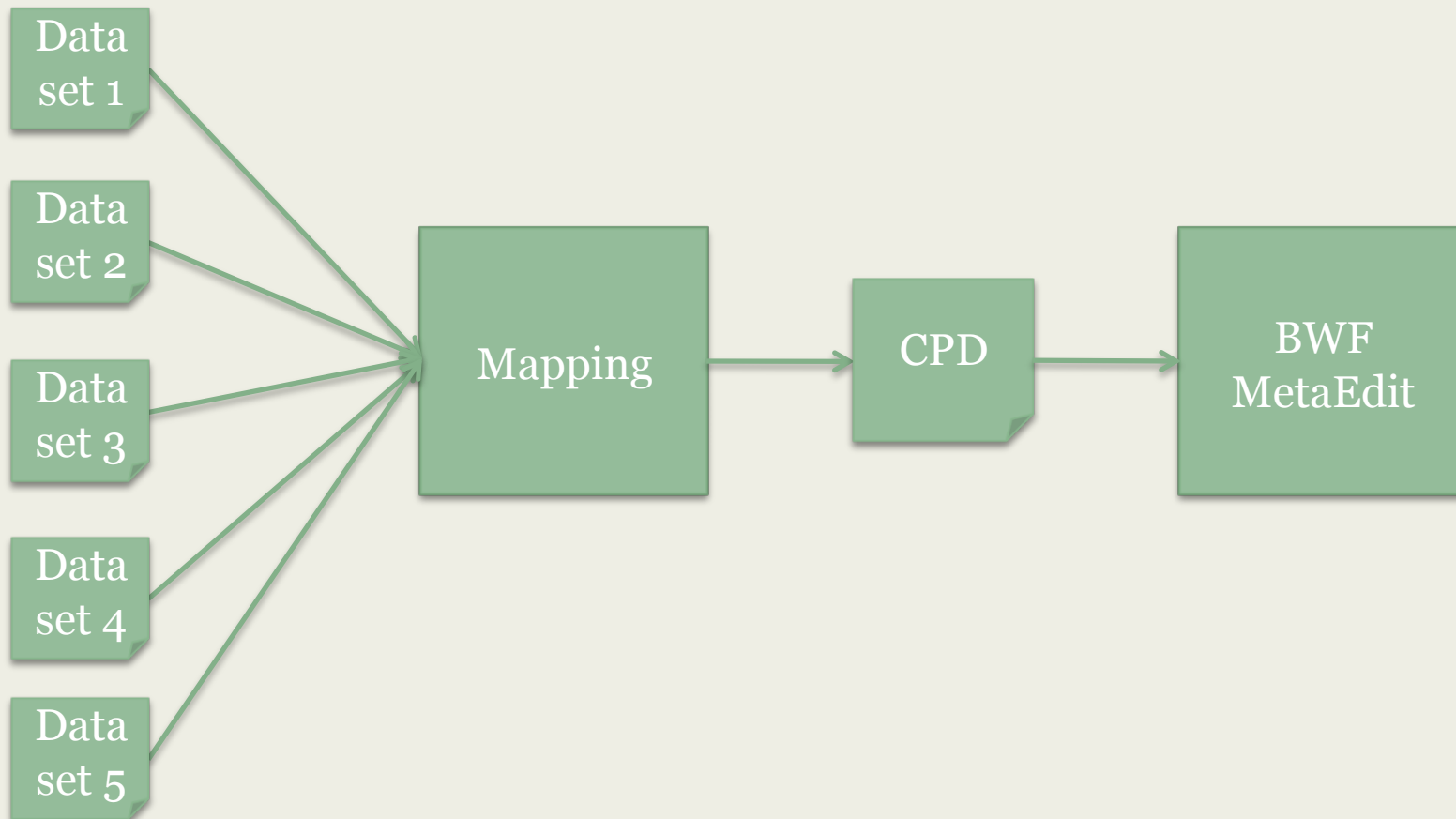
- Reading, Editing and Writing of bext, LIST INFO, axml, XMP and iXML
- Singular and Batch processing
- Cross-Platform (Windows, Mac and Unix)
- Command Line Interface and GUI
- CSV and XML based importing and exporting
- Optional enforcement of standards and guidelines (rule sets)
- Global Y/N overwrite existing metadata
- Field-Specific write
- Undo
- Audio-only MD5 checksum creation
- RF64 support

Conformance Point Document



- Defines a simple common structure to map to from the wildly variable metadata that exists across organizations.
- Necessary to enable batch embedding and exporting.
- Enables Validation against standards and rule sets of prior to embedding
- CSV or XML based

Conformance Point Document



Overview and some features



- Tour of BWF MetaEdit
- Help Menu
- Audio Only Checksum and embedding
- Undo
- Having a file adopt it's creation date and time by right clicking on those values
- Helper for formatting coding history data
- Apply to all open files
- Rule conformance

Activity 1



Open an invalid file and see what happens

Activity 2



1. Open files with no metadata
2. Create a Conformance Point Document from BWF MetaEdit
3. Populate CPD
4. Import CPD
5. Save to files

Activity 3



1. Open files with existing metadata
2. Edit in the program
 - Coding History
 - Set to origination time and date
 - Set rule preferences and show conformance and no conformance
 - Time Reference Changes
 - Copy value to all open files
 - Export XML chunk
 - Import XML chunk

Activity 4



1. Open files with existing metadata
2. Export CSV
3. **Import** to Excel
4. Show how you can filter, sort, run equations, etc.

Thanks!



CHRIS LACINAK

AUDIOVISUAL PRESERVATION SOLUTIONS

MUSIC LIBRARY ASSOCIATION 2011, PHILADELPHIA

FEBRUARY 10TH, 2011

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