

# Captioning and DVI Broadcast to Web

Megan McGough

FRONTLINE OutPost

WGBH - Boston





# Before we begin...

- What are Closed Captioning & Descriptive Video Information?
  - Systems of Media Access for hearing-impaired and visually-impaired viewers
  - Each system has established conventions that should be respected



# Closed Captioning

- Closed Captioning is mandated by the FCC for all broadcasts
  - Exemptions for non-emergency material under 10 minutes and small stations
- *21<sup>st</sup> Century Communications and Video Accessibility Act* requires Closed Captions to migrate to IP distribution





# Closed Captioning





Handwritten text, possibly a name or signature, written vertically in a light color.





# Descriptive Video Information

- The *21<sup>st</sup> Century Communications and Video Accessibility Act* requires DVI to be passed through if present
- Exceptions for technical inability or other use, such as existing SAP transmission

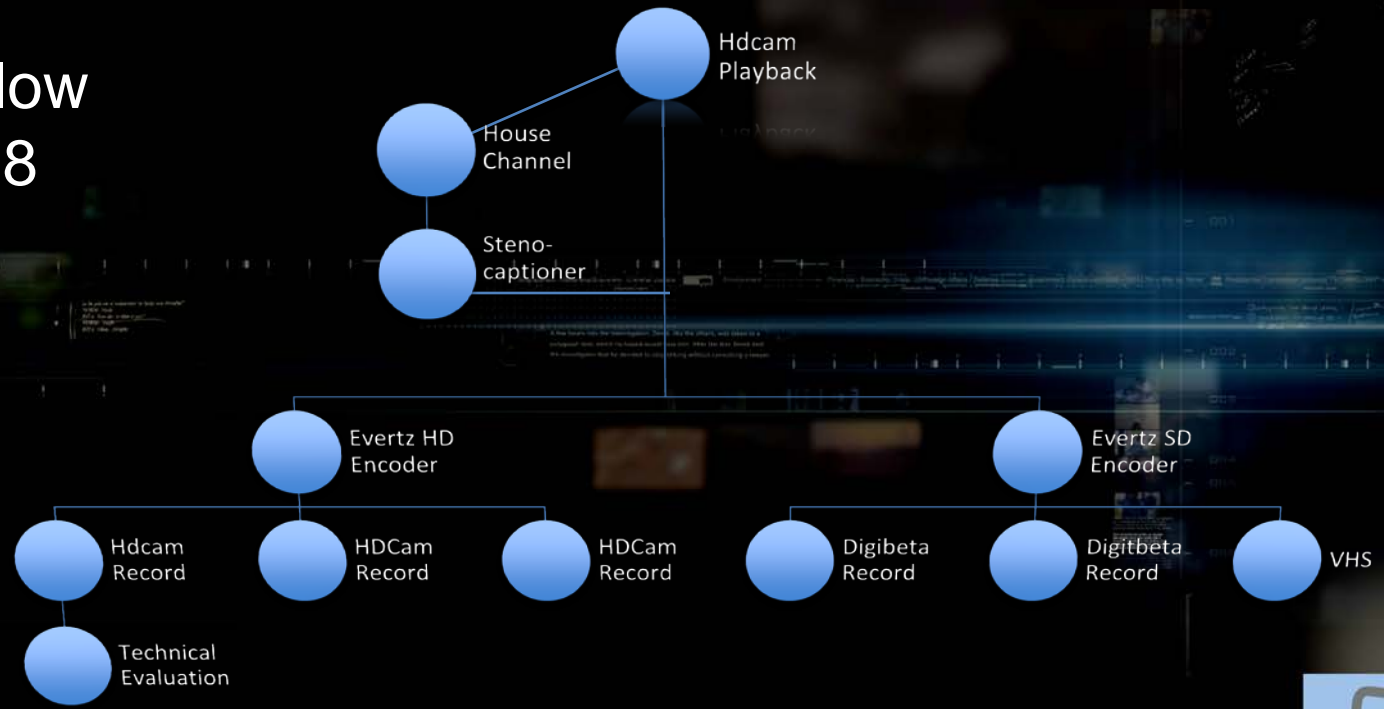
# The Challenge:

- Closed Captioning workflows are well-established and often automated
- Broadcast workflow may dictate IP-based caption workflow



# Case Study: FRONTLINE

Workflow  
2008



# Case Study: FRONTLINE

- Workflow circa 2008
  - Adapted live captioning during Technical Evaluation and Dubs
    - Inefficient
    - Expensive
    - Prone to Errors
    - Did not meet TOS for Containerization



# CC: Workflow Considerations

- Who is responsible?
  - Producer v. Distributor
- Where will the work be done?
  - Vendor v. DIY/ In-House
- What tools will you use?
  - Software v. Hardware



# Producer v. Distributor

- Producer can control content changes and versioning
- Distributor streamlines delivery process & distribution



# Vendor v. DIY

- Vendor is specialist in Captioning style, formats & file-types
- DIY allows for multiple changes to content, increasingly easy & cheaper



# Software v. Hardware

- Software easily updated, installed on multiple workstations, generally cheaper
- Hardware is more efficient, automated & integrated into existing workflows



# Closed Captioning

- Many file-types for Closed Captioning creation and distribution
  - .tds, .cap, .scc, .srt, .xml, .txt, .smi
- *21<sup>st</sup> Century Communications and Video Accessibility Act* designates SMPTE-TT as the safe-harbor format for IP distribution



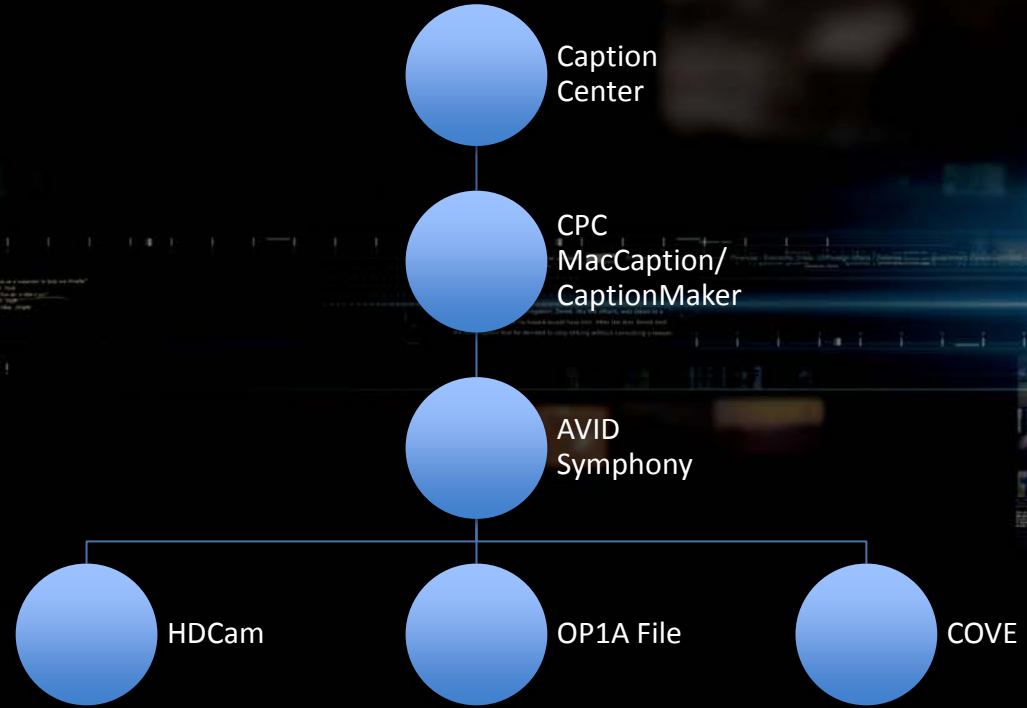
# Case Study: FRONTLINE

- Fast turnaround workflow with ability to make content changes up to last minute, preferably in-house
- Unable to hire in-house additional work
- Broadcast, Home Video and Web distribution
- Need Vendor for potential live broadcasts



# Case Study: FRONTLINE

Workflow  
2013



# Case Study: FRONTLINE

- Caption Center
  - .tds for broadcast,
  - .scc for DVD, archiving
- CPC MacCaption
  - .aaf for Avid
  - SMPTE-TT .xml for Web
  - .smi for web





>> (translated): My greatest joy will be to become a martyr.



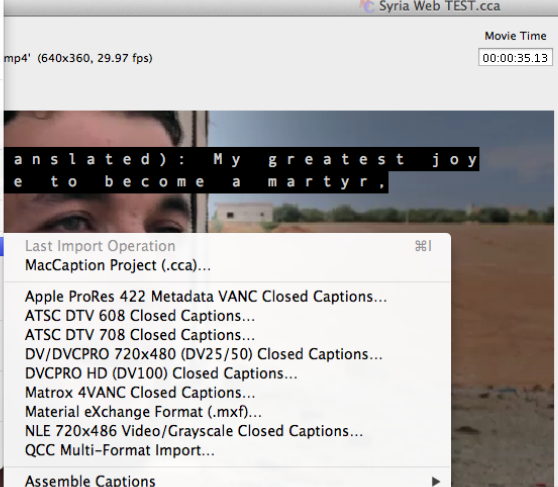
Control Mode

• Edit Time Stamp Autosync Live Caption

00:00:00:00	--	
00:00:19:08	--	>> NARRATOR: Tonight on <i>Frontline</i> ,
00:00:20:28	--	two enemies face each other in a brutal civil war.
00:00:27:00	--	On one side, a young rebel soldier fighting to the death
00:00:31:07	--	to bring down the regime of President Bashar al-Assad.
00:00:35:12	--	>> (translated): My greatest joy will be to become a martyr,
00:00:38:12	--	and for Syria to be liberated.
00:00:40:25	--	>> NARRATOR: Facing him, a career soldier,
00:00:43:06	--	determined to preserve the Assad regime.
00:00:46:14	--	>> (translated): We are all martyrs in the marking,
00:00:48:11	--	to keep our country safe.
00:00:50:01	--	>> NARRATOR: Two countrymen, now enemies,
00:00:52:15	02:18	in a conflict increasingly driven by hatred.
00:00:59:08	--	(explosion)



- New Window ⌘N
- Open Project... ⌘O
- Open Movie... ⌘O
- Open Recent ▶
- Close Window ⌘W
- Close Project ⌘W
- Close Movie ⌘W
- Save ⌘S
- Save As... ⌘S
- Properties...
- Import ▶
- Export ▶
- Add To File ▶
- Convert ▶
- Batch... ⌘B
- Player...
- Capture Video...
- Real Time Decode...
- Print MPEG to FireWire... ⌘P
- Print to Video... ⌘P



Syria Web TEST.cca

Movie Time 00:00:35.13 Caption Time 00:00:35:12 Horiz C Vert T Just L Display Mode Pop-On Program A Decode CCL

00:00:00:00 -- 0 WPM

00:00:19:08 -- >> NARRATOR: Tonight on *Frontline*, 180 WPM

00:00:20:28 -- two enemies face each other in a brutal civil war. 98 WPM

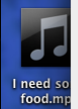
00:00:27:00 -- On one side, a young rebel soldier fighting to the death 155 WPM

00:00:31:07 -- to bring down the regime of President Bashar al-Assad. 129 WPM

00:00:35:12 -- >> (translated): My greatest joy will be to become a martyr.

- Last Import Operation ⌘I
- MacCaption Project (.cca)...
- Assemble Captions ▶
- Caption/Subtitle Formatted File ▶
- For Multiple Language...
- Plain Text File...
- QuickTime DTV 608/708 Closed Captions (.mov, .m4v)...
- QuickTime/Podcast Closed Captions (.mov, .m4v)...
- QuickTime Subtitles (.mov, .m4v)...
- QuickTime Text Track (.mov, .m4v)...
- QuickTime Text Track Text (.txt)...
- CCube/LSI DVx 608 Linear Closed Captions...
- CCube/LSI DVx 608 Temporal Closed Captions...
- DVD Closed Captions (from MPEG2)...
- SCTE 20 608 Closed Captions...
- SeaChange Closed Captions...
- Sony XDCAM .mov Closed Captions...

- Anystream (.xml)...
- AVID DS (.txt)...
- Caption Center (.tds)...
- Captions, Inc. (.cin)...
- CCaption Description File (.asc)...
- Cheetah International (.asc)...
- Cheetah International (.cap)...
- CPC-715 File (.onl)...
- DLP Cinema (.xml)...
- DVD Caption File (.cc, .scc)...
- DVD Studio Pro (.stl)...
- EBU Subtitling Data Exchange Format (.stl)...
- Evertz ProCAP (.txt)...
- Inquiry InqScribe (.txt)...
- iTunes (.itt)...
- MacCaption VANC (.mcc)...
- National Captioning Institute (.cap)...
- National Captioning Institute (.flc)...
- Rhozet (.xml)...
- SAMI, Synchronized Accessible Media Interchange (.smi)...
- Sofni (.sub)...
- Softitler (.txt)...
- SonicText (.txt)...
- Sony Blu-ray Subtitles (.txt)...
- SubRip (.srt)...
- Timed Text DFXP (.xml)...
- Ultech Caption (.ult)...
- WebVTT (.vtt)...
- YouTube (.sbv, .srt)...



I need so food.m



mp4' (640x360, 29.97 fps)

Movie Time

Caption Time

Horiz

Vert

Just

Display Mode

Program

Decode

00:00:40:26

00:00:40:25

C

T

L

Pop-On

A

CC1



00:00:00:00 --



0 WPM

00:00:19:08 --



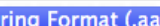
180 WPM

00:00:20:28 --



98 WPM

00:00:27:00 --



NARRATOR: Facing him,  
career soldier,

Last Export Operation ⌘E

ATSC DTV 608/708 Closed Captions (to MPEG2)...

DV/DVCPRO 720x480 (DV25/50) Closed Captions...

NLE ▶

HD ▶

Podcast/Web/QuickTime 608 ▶

Black Movie with Subtitles...

Movie with Combined Subtitles...

Movie with Separate Subtitles...

DVD/Blu-ray Subtitles ▶

Apple XML Interchange Format (.xml)...

Digital Cinema Distribution Master (.xml) ...

EBU Subtitling Data Exchange Format (.stl)...

Rhozet (.xml)...

Texas Instruments DLP Cinema XML (.xml)...

Caption Formatted File ▶

Plain Text File...

Korean Closed Captions ▶

Remove MPEG2 DTV 608/708 Closed Captions...

Avid Advanced Authoring Format (.aaf)...

DVCPRO HD (DV100) .mov Closed Captions...

MacCaption VANC Data File (.mcc)...

MacCaption MCC Version 2 (.mcc)...

Matrox 4VANC Closed Captions...

QuickTime DTV 608/708 Closed Captions Track...

SeaChange Closed Captions...

Sony Material eXchange Format (.mxf)...

>> NARRATOR:  
Tonight on *Frontline*,

two enemies face each other  
in a brutal civil war.

On one side, a young rebel  
... to the death

... the regime of  
... har al-Assad.

... My greatest joy  
... me a martyr,

and for Syria to be liberated.

>> NARRATOR: Facing him,  
a career soldier,

determined to preserve  
the Assad regime.

 Live Caption

- New Window ⌘N
- Open Project... ⌘O
- Open Movie... ⌘O
- Open Recent ▶

- Close Window ⌘W
- Close Project ⌘W
- Close Movie ⌘W

- Save ⌘S
- Save As... ⌘S

Properties...

Import ▶

**Export** ▶

Add To File ▶

Convert ▶

Batch... ⌘B

Player...

Capture Video...

Real Time Decode...

Print MPEG to FireWire... ⌘P

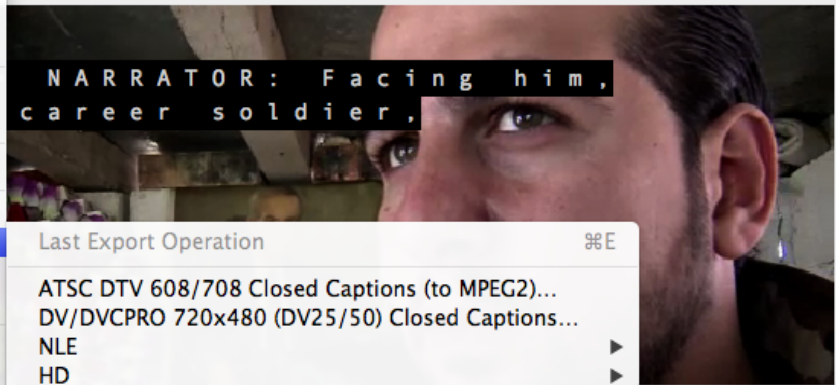
Print to Video... ⌘P

mp4' (640x360, 29.97 fps)

Movie Time 00:00:40:26

Caption Time 00:00:40:25

Horiz C Vert T Just L Display Mode Pop-On Program A Decode CC1



00:00:00:00 --

0 WPM

00:00:19:08 --

>> NARRATOR:  
Tonight on *Frontline*,

180 WPM

00:00:20:28 --

two enemies face each other  
in a brutal civil war.

98 WPM

00:00:27:00 --

On one side, a young rebel  
soldier fighting to the death

Last Export Operation ⌘E

- ATSC DTV 608/708 Closed Captions (to MPEG2)...
- DV/DVCPRO 720x480 (DV25/50) Closed Captions...
- NLE ▶
- HD ▶

**Podcast/Web/QuickTime 608** ▶

- Black Movie with Subtitles...
- Movie with Combined Subtitles...
- Movie with Separate Subtitles...

- DVD/Blu-ray Subtitles ▶
- Apple XML Interchange Format (.xml)...
- Digital Cinema Distribution Master (.xml) ...
- EBU Subtitling Data Exchange Format (.stl)...
- Rhonet (.xml)...
- Texas Instruments DLP Cinema XML (.xml)...

- Caption Formatted File ▶
- Plain Text File...

- Korean Closed Captions ▶
- Remove MPEG2 DTV 608/708 Closed Captions...

- Flash Text (.txt)...
- Flash XML for Captionate (.xml)...
- Flash XML for CS4 [Timed Text DFXP] (.xml)...
- iTunes (.itt)...
- QuickTime (.txt, .smi)...
- QuickTime 608 Closed Captions (FCP/Podcast/Web)...
- QuickTime Subtitles Track...
- QuickTime Text Track...
- RealText (.rt, .smi)...
- SMPTE Timed Text (.xml)...**
- Timed Text DFXP (.xml)...
- WebVTT (.vtt)...
- Windows Media Player... ▶
- YouTube (.srt)...

regime of  
-Assad.

greatest joy  
martyr,

liberated.

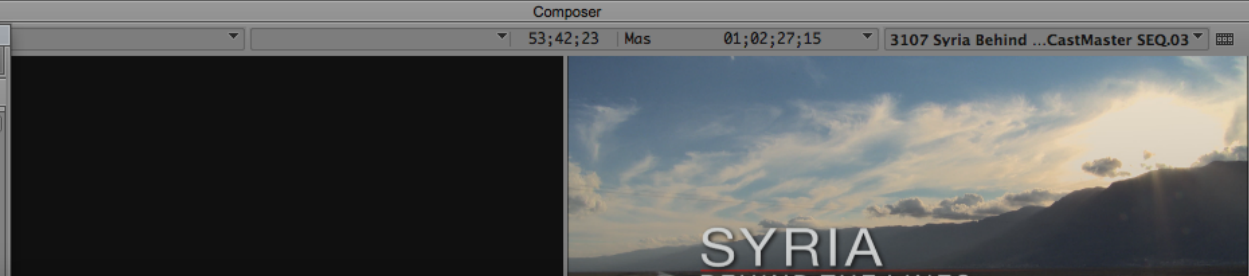
acing him,

determined to preserve  
the Assad regime.

3107\_Syria\_Online - megan\_mcgough

Caption files Syria

Name	Creation Date	Duration	Drive
3107_ClosePackaging_REV	3/22/13 12:35:15 PM	2:38:25	3107_Syria [rvid]
3107SyriaCloseCtPS	3/22/13 7:58:46 AM	2:37:25	3107_Syria [rvid]
3107_Syria_Doc_REV_alt	3/22/13 7:22:37 AM	52:31:20	3107_Syria [rvid]
3107_Syria_Doc_REV	3/22/13 7:14:28 AM	52:31:20	3107_Syria [rvid]
3107 Syria CtPS4	3/20/13 12:36:56 PM	52:29:20	3107_Syria [rvid]
3107 Syria CtPS3	3/20/13 10:05:34 AM	52:29:20	3107_Syria [rvid]



Select files to Import

3107 Syria

Name	Date Modified	Size	Kind
3107 Syria Behind Lines Master.xml	Mar 28, 2013 3:52 PM	641 KB	XML document
3107 Syria Close	Mar 22, 2013 11:37 AM	--	Folder
3107_ClosePackaging_REV.aaf	Mar 22, 2013 4:37 PM	1.6 MB	Avid... (Avid Project File)
3107_Syria_Doc_REV_alt.aaf	Mar 22, 2013 11:24 AM	25.7 MB	Avid... (Avid Project File)
3107_Syria_Doc_REV.aaf	Mar 22, 2013 11:16 AM	25.7 MB	Avid... (Avid Project File)
FL3107ClosePkg.cca	Mar 22, 2013 4:35 PM	18 KB	MacC...
FL3107Doc_REV_alt.cca	Mar 22, 2013 11:27 AM	189 KB	
FL3107Doc_REV.cca	Mar 22, 2013 11:18 AM	190 KB	
Syria Web TEST.cca	Mar 28, 2013 3:53 PM	189 KB	

01;02;27;15 01:02;15;06

Track	Clip	Label
D11		
V11		SyriaT
V10		Syria R
V9		
V8		St
V7		
V6		
V5		SyriaT
V4		
V3		
V2	penNoDate.mov	
V1	ou	3107 Syria PMW
A1		mere
A2		mere
A3	0_BrandB_Full.wav	PMW_C
A4		

Enable: Any

Options...

Resolution: DNxHD...

Disk Label:

000 000

01:04;15;10

PMW; PMW\_09C PMW PMW PMW

ew.01

ew.01

P PMW\_0 PMW\_072 PMW P

3107\_Syria\_Online - megan\_mcgough

Caption files Syria

Caption files Syria

	Name
<input type="checkbox"/>	3107_Syria_Behind Lines BCastMaster SEQ.03,Data Mixdown,1.Expo
<input type="checkbox"/>	3107_Syria_Behind Lines BCastMaster SEQ.03,Data Mixdown,1.Expo
<input type="checkbox"/>	3107_Syria_Behind Lines BCastMaster SEQ.03,Data Mixdown,1
<input type="checkbox"/>	3107_ClosePackaging_REV
<input type="checkbox"/>	3107SyriaCloseCAPS
<input type="checkbox"/>	3107_Syria_Doc_REV_alt
<input type="checkbox"/>	3107_Syria_Doc_REV
<input type="checkbox"/>	3107_Syria CAPS4
<input type="checkbox"/>	3107_Syria CAPS3

Untitled

Composer

3107 Syria Doc REV alt

1;16;02 Mas 01;40;04;15 3107 S

A bag of bread, for

Timeline - 3107\_Syria\_Doc\_REV\_alt

01;40;04;15

<input type="checkbox"/>	D1	D1	3107_Syria_Doc_REV_alt
<input type="checkbox"/>	V11		
<input type="checkbox"/>	V10		
<input type="checkbox"/>	V9		
<input type="checkbox"/>	V8		
<input type="checkbox"/>	V7		
<input type="checkbox"/>	V6		
<input type="checkbox"/>	V5		
<input type="checkbox"/>	V4		
<input type="checkbox"/>	V3		
<input type="checkbox"/>	V2		

3107\_Syria\_Online - megan\_mcgough

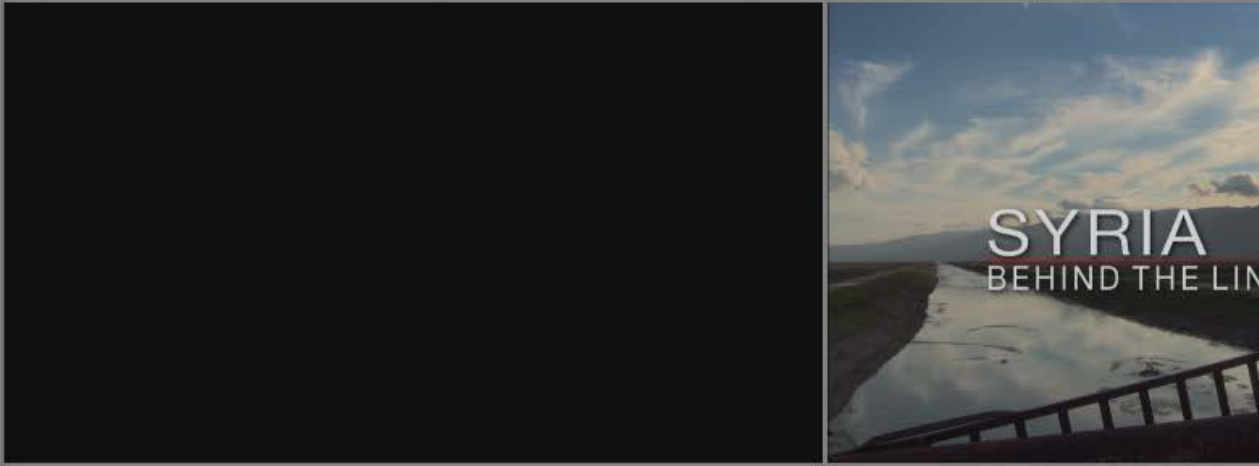
Bins Volumes Settings Format Usage Info

New Bin

! 3107_SyriaBehindtheLines SEQ.80.avb	41,572K	EDIT3-
3107_EDL	9,745K	
3107_Syria_Cove	35,642K	OutPos
3107_Syria_WMchange	41,618K	
3107_SyriaBehindtheLines OP1A	48,932K	EDIT2-
3107_SyriaBTL_DocMaster	11,166K	
3107_SyriaBTL_IntlMaster	29,352K	
01) Sequence bins		
02) Dailies and Media		
03) Audio Bins		
05) Work Bins		
06) Caption bins		
Caption files Syria	25K	ml-20
Sub Samples	270K	
EDIT6-PC		
07) Graphics bins		
EDIT2-PC		

Composer

53;42;23 Mas 01;02;27;15 3107



Timeline - 3107 Syria Behind Lines BCastMaster SEQ.03

01;02;27;15

01;02;15;06 01;02;30;06 01;02;45;06 01;03;00;08 01;03;15;08 01;03;30;08 01;03;45;08 01;04;00;00

01;02;27;15

01;02;15;06 01;02;30;06 01;02;45;06 01;03;00;08 01;03;15;08 01;03;30;08 01;03;45;08 01;04;00;00

D1	3107_Syria_Doc_REV_alt
V11	SyriaTextlessMaster.01 (25.00 FPS)
V10	Syria Reference V2.mov
V9	
V8	Syria B Syria C
V7	
V6	
V5	SyriaTextlessMaster.01 (25.00 FPS)
V4	Filler
V3	Filler
V2	openNoDate.mov

3107\_Syria\_Online - megan\_mcgough

\* Caption files Syria


Name	Creation Date	Duration
3107_ClosePackaging_REV	3/22/13 12:35:15 PM	2:36
3107SyriaCloseCAPS	3/22/13 7:38:46 AM	2:37
3107_Syria_Doc_REV_alt	3/22/13 7:22:37 AM	52:31
3107_Syria_Doc_REV	3/22/13 7:14:26 AM	52:31
3107 Syria CAPS4	3/20/13 12:36:56 PM	52:29
3107 Syria CAPS3	3/20/13 10:05:34 AM	52:29

Untitled

- Site Settings
- Composer Settings... ⌘=
- Restore To Default
- Audio Mixdown...
- Video Mixdown...
- Data Mixdown...**
- Read Audio Timecode
- Restore Default Patch
- Sync Point Editing
- Show Phantom Marks
- ✓ Render On-the-Fly
- MultiCamera Mode ⌘⇧M
- Remote Play and Capture
- Device ▶
- Full Screen Playback ⌘⇧F
- Register Your Software...
- Deactivate Software License...

Composer

14;22;10 Mas 01;52;58;23 3107 Syria Behind ...CastMaster SEQ.03



Ahmad returned to the front line,  
but was injured twice more.

Timeline - 3107 Syria Behind Lines BCastMaster SEQ.03

52;58;23

01:47:32:28 01:48:33:00 01:49:33:02 01:50:33:02 01:51:33:04 01:52:33:06 01:53:33:08 01:54:33:10 01:55:33:12

D1	D1	3107_Close	3107_Close	3107_ClosePackaging_REV			
V11	tless S Syria	SyriaTextlessMaster.01 (25.00 FPS)	SyriaTextlessMaster.01 (25.00 FF)	SyriaTextlessMaster.01 (25.00 FF)	SyriaTextlessMaster.01 (25.00 FF)		
V10							
V9							
V8							
V7							
V6							
V5	tless S Syria	SyriaTextlessMaster.01 (25.00 FPS)	SyriaTextlessMaster.01 (25.00 FF)	SyriaTextlessMaster.01 (25.00 FF)	SyriaTextlessMaster.01 (25.00 FF)		
V4							
V3							
V2							
V1							
A1		airstrike element	eye contact 1	where is the world 1c.	where is the world 1	declination 1a.m	3108 RETIR
A2		airstrike element	eye contact 1	where is the world 1c.	where is the world 1	declination 1a.m	3108 RETIR

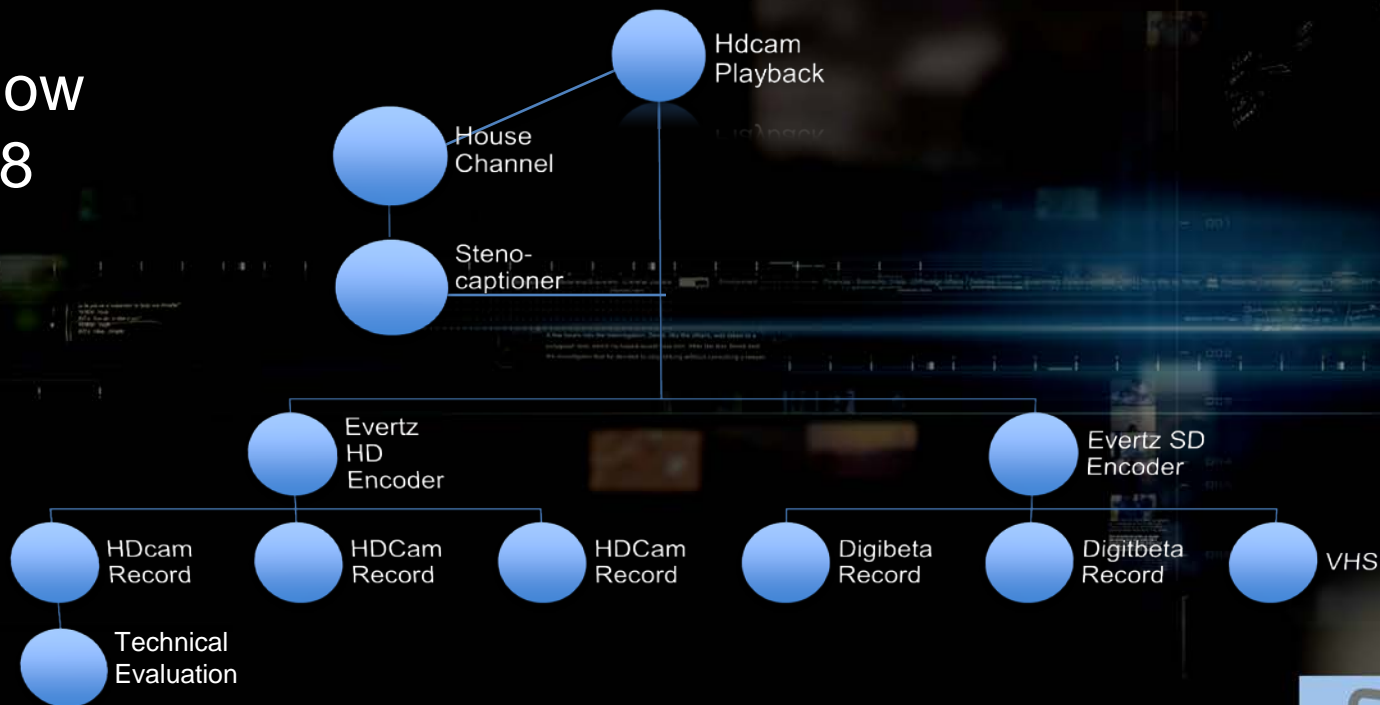
# Case Study: FRONTLINE

- Avid Symphony
  - HDCam output
  - OP1a file-based delivery
  - Avid DNX 145 Quicktime master
- El Gato Turbo
  - h.264 Quicktimes for COVE & mobile
  - Automated upload to FTP



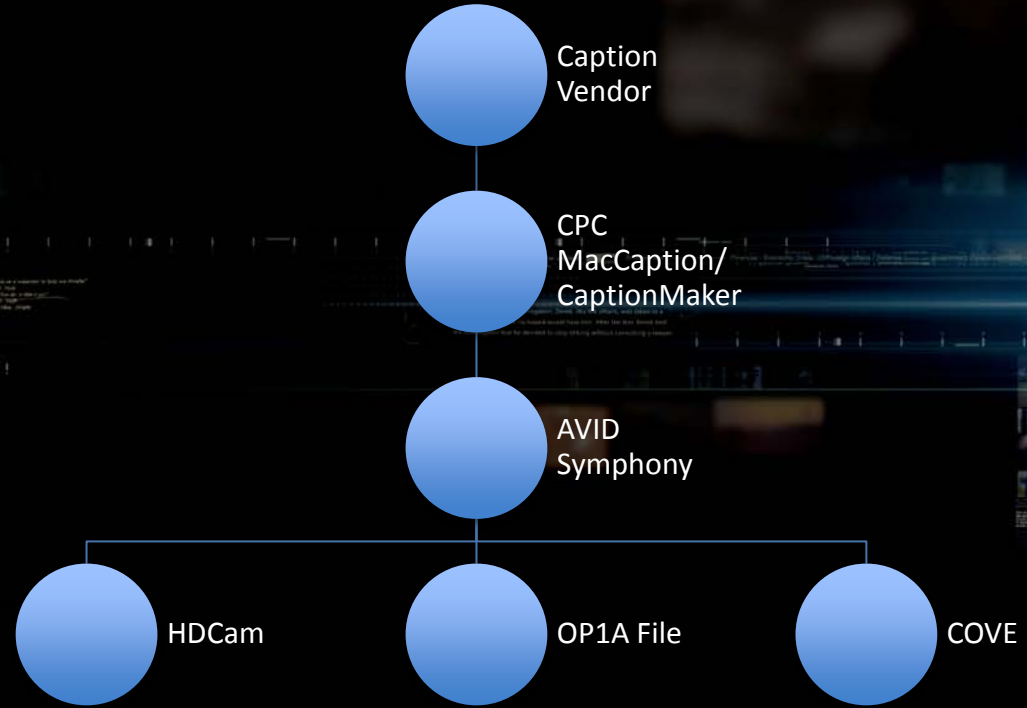
# Case Study: FRONTLINE

Workflow  
2008



# Case Study: FRONTLINE

Workflow  
2013



# Case Study: FRONTLINE

- Producer Centered
- Vendor & DIY
- Software Centered
- Broadcast & IP



# Case Study: FRONTLINE

- Saved time fewer weekend encodes, no live steno-captioner
- Saved money – less overtime, less expensive process, less revision



# Case Study: FRONTLINE

- Better quality – pop-up style captions, improved sync, content more easily corrected,
- Future-proofing – archiving .tds, .scc and .smi for alternate distribution
  - Complete File-based masters



# Closed Captioning

- DIY captioning is not for everyone
- Take advantage of available resources
  - National Center for Accessible Media
  - Captioning and Description Key



# Case Study: PBS COVE

- Steve Scheel
  - Sr. Director of Media Operations & Services,  
PBS Media Operations Center



# COVE Captioning

- PBS.org - captions are added by the player when streams are played
  - Variety of captions formats accepted
    - TTML, SAMI, SRT, SCC, DXFP, and SMPTE TimedText
- Handheld device files (mp4, HLS) have captions inserted as scc data tracks during transcode in the cloud

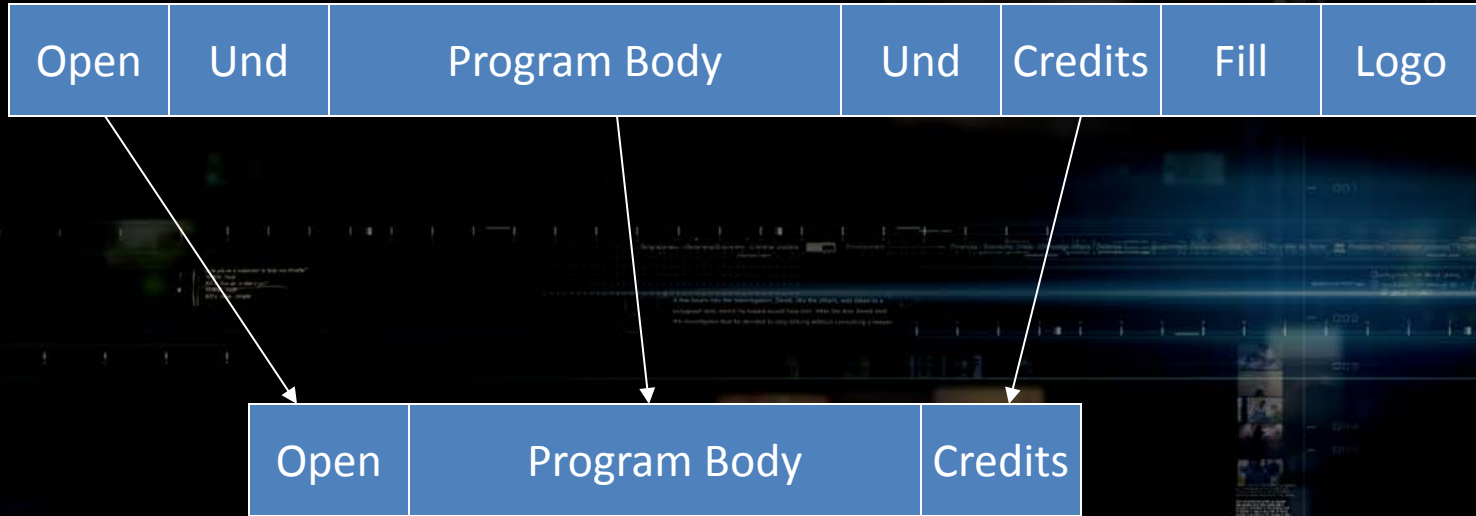


# Caption File Formats

- TTML - Timed Text Markup Language
  - DXFP
  - SMPTE Timed Text
  - “cleaned up” DXFP used by Cove streaming
- SCC - widely used
- SAMI - Does not contain positioning information



# Containerized Program



```
<Transcode xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <Package>
    <PackageNumber>P354947-010</PackageNumber>
    <OutputFilename>P354947-010HDI</OutputFilename>
    <StartTimeCode>01:00:00:00</StartTimeCode>
    <Nola>MSPE 000208</Nola>
    <Containerized>True</Containerized>
    <SeriesTitle>Martha Speaks</SeriesTitle>
    <EpisodeTitle>Paws and Effect/The Trouble with Teddy</EpisodeTitle>
    <PackageStatus>Defined</PackageStatus>
    <NextAirDate>04/10/2013 07:30:00</NextAirDate>
    <Elements>
      <Element>
        <Sequence>5</Sequence>
        <Type>OPN</Type>
        <Class>TRA</Class>
        <Description>OPEN/TEASE</Description>
        <MediaNumber>1175870HR</MediaNumber>
        <MediaRevisionNumber>1175870-1</MediaRevisionNumber>
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        <Audio>Stereo</Audio>
        <AspectRatio>16:9</AspectRatio>
        <TimeCodeIn>01:00:30.01</TimeCodeIn>
        <Duration>00:00:59.28</Duration>
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      <Element>
        <Sequence>6</Sequence>
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        <Class>SEG</Class>
        <Description>BOD</Description>
        <MediaNumber>1175870HR</MediaNumber>
        <MediaRevisionNumber>1175870-1</MediaRevisionNumber>
```

# Automated COVE Caption Process

- XML list generated
- Cinegy transcodes pieces while extracting VANC or 436M captions into SMPTE Timed Text file
- Mezzanine video file is QC'ed by BATON
- Report, MP4 video file and TT file automatically uploaded to S3 cloud



# Software Tools

- Cinegy Convert
- CPC
- Software tool for synchronizing caption  
(Nexidia , Softel)



# Case Study: Live to IP

- Currently, no magic bullet
  - Some promising products
- Time delay in established workflows to ingest and prepare Captioning and video for web



# Descriptive Video Information

- DVI is a separate audio track with additional explanatory voice-over to describe visuals and text
- DVI is not mandated by the FCC for PBS stations



# DVI Broadcast Workflow

- 2-3 days for scripting, diction appropriate to your audience
- Separate voice-over artist, distinct from the narrator and other voices in your program



# DVI Broadcast Workflow

- Combined with final mix (+2-3 hrs)
- Deliver as separate audio channel
- Broadcast as SAP,
  - Many TV's have an audio source selection to select Visually Impaired or other language audio source.



# DVI IP-distribution Workflow

- Post secondary audio with media
  - COVE does not support SAP
  - JW Player does on desktop, not mobile
- Post as separate asset
- Post as Audiocast



# Looking Forward

- Improved Broadcast to IP solutions
- Improved integration of Captioning in NLEs and Players
- Wider FCC mandate for DVI
- DVI for IP solutions



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Contacts:

[sscheel@pbs.org](mailto:sscheel@pbs.org)

[megan\\_mcgough@wgbh.org](mailto:megan_mcgough@wgbh.org)

[@mmcough\\_wgbh](https://www.instagram.com/mmcgough_wgbh)

