Technology for production staff – the importance of specifications and metadata

NaSTA CONFERENCE @ LEEDS APRIL 2016
PETER WEITZEL SEC/ TREASURER SMPTE UK

Let’s start with “what is SMPTE?”
Society of Motion Picture and Television Engineers
Based on three Pillars

- Members – we have 6700 around the world – 570+ in UK
- Education – we run meetings/lectures - in about 20 places in UK
  ..... And webcast and Conferences and courses plus Journal
- Standards - over 800 fundamentals for Film TV and Digital media

And is 100 Years Old

.... And we support Student Production

SMPTE – HPA Student Film Festival

6 Categories

- Best creative use of entertainment technology to engage the audience in the story – narrative format. (max. five min.)
- Best creative use of entertainment technology to engage the audience in the story – narrative format. (max. 30 sec.)
- Best portrayal of entertainment technology in the film – documentary format. (max. five min.)
- Best portrayal of entertainment technology in the film – documentary format. (max. 30 sec.)
- Best use of virtual reality in storytelling – narrative format. (max. three min.)
- Best use of mobile device or tablet to convey a story – narrative format. (max. three min.)


What excites the techies
**UHD**

It is Not just "4k" actually 3920*2060 4 times as many pixels than HD

But it has better pixels "UHD ph2" using

- High Dynamic Range (HDR)  
  Blacks backer, whites whiter and highlight s fantastic

- Wide Colour Gamut (WCG)

- Immersive audio – Using Objects

- High Frame Rate so that motion looks smooth

---

**IP ...... and VR**

**IP**

Carrying Live Video over Computer Networks rather than Coaxial cables

Most will use Software Defined Networks SDN

Has been used for over 15 years between buildings compressed video,  
Now coming to within building Uncompressed 3 Gigabit/sec HD plus UHD ......

**Virtual Reality VR**

A 360 view in all directions -... Is it just a hype?  
(where do you put the lights and crew?)

Louis Arrigoni from Solent won SMPTE HPA Film Festival 2015 VR Prize
Techy things you may not have heard of!

Specifications and metadata

Specifications

Take Standards (fundamentals for Film TV and Digital media) which enable interoperability - SMPTE sets Standards

And the specification provides a Profile for use within a smaller group

e.g UK Specification for TV limits frame rate to 25Hz (not 60 or “59.94“)

In the UK two key specification bodies

  how Broadcasters and Receivers work = “Freeview HD” mark

- Digital Production Partnership “DPP” https://www.digitalproductionpartnership.co.uk/
  How Producers deliver Programmes to Broadcasters
  (technical and metadata)

www.smpte.org/uk
DPP

A forum for those who make and deliver / receive programmes

..... And provide services – Like Facilities Houses /POST

............ Or equipment – like Editing / MAM etc.

Publishes some guides open to all - and the Technical Delivery specification for UK TV (and soon to be USA TV)

And some tools to help the Production Community

Interoperability

“something made by A will work with B .. Z”

SMPTE first Standard
- defined where the perforations were on film

Prior to that there were 9 different formats – each camera worked with its own projector

But USA was entering the war and needed Army training films

So ONE format for delivery and use required

So US DoD specified SMPTE Standard
You need to have what you make able to be (easily) used

**Specification** takes (world) Standards and adds further restrictions which make things work where it is meant to be used.

- e.g. in Europe all TV is transmitted at 50 Hz Field Rate
- While in USA all TV is transmitted at 59.94 Field Rate
- So UK broadcasters require delivery of Programmes at 50Hz only
  (and USA 59.94Hz only)

---

**DPP Delivery Specification HD**

DPP is a industry group based in UK

"*The DPP is here to make the move to fully digital, global, internet-enabled content creation and distribution work more productively for all.*"

Major work is

Specifications for delivery of TV Programmes (and commercials) to the major UK Broadcasters – BBC itv Ch. 4 C5 Sky BT Sport

Explanatory documents on file based production etc...

[www.digitalproductionpartnership.co.uk/](http://www.digitalproductionpartnership.co.uk/)

Anyone working in TV industry needs to be aware of DPP Specifications

... Not just the techies – but you can leave them to sort of techie things
DPP HD delivery speciation

- Picture and Sound Quality requirements, which also form a binding obligation on producers of material.
- Technical Specifications
- Delivery Requirements

https://www.digitalproductionpartnership.co.uk/what-we-do/technical-standards/programme-delivery-standards

Picture & Sound Quality – the top 4 items

Picture
- The picture must be well lit and reasonably but not artificially sharp.
- The picture must be free of excessive noise, grain and digital compression artefacts.
- The picture must be free of excessive flare, reflections, lens dirt, markings and obstructions (e.g. lens hood), and lens aberrations.
- Movement must appear reasonably smooth and continuous, and must not give rise to distortions or break-up to moving objects, or cause large changes in resolution.

Sound
- Sound must be recorded with appropriately placed microphones, giving minimum background noise and without peak distortion.
- The audio must be free of spurious signals such as clicks, noise, hum and any analogue distortion.
- The audio must be reasonably continuous and smoothly mixed and edited.
- Audio levels must be appropriate to the scene portrayed and dynamic range must not be excessive. They must be suitable for the whole range of domestic listening situations.
Technical Standards headlines

Video
• 1920 x 1080 pixels in an aspect ratio of 16:9
• 25 frames per second (50 fields) interlaced - now known as 1080i/25.
• colour sub-sampled at a ratio of 4:2:2

Which Passes these Tests
• Photosensitive Epilepsy (PSE)
• Automated Quality Control (AQC)
• ‘Eyeball’ Quality Control testing
• File compliance testing

Audio
• Stereo and 5.1 to R188 Loudness
• AV sync to 5ms

File Delivery

Each high definition programme must be delivered as a single MXF OP-1a file which conforms to the AMWA specification AS-11 v1.1.

MXF is SMPTE standard ST 377M plus ..........  
SMPTE EG41: MXF Engineering Guide (A guide explaining how to use descriptive metadata in MXF)
SMPTE EG42: MXF Descriptive Metadata (A guide explaining how to use descriptive metadata in MXF)

Operational patterns:
• SMPTE 390M: OP-Atom (a very simple and highly constrained layout for single MXF files)
• SMPTE 378M: OP-1a (the layout options for a minimal simple MXF file)
• SMPTE 391M: OP-1b
• SMPTE 392M: OP-2a
• SMPTE 393M: OP-2b
• SMPTE 407M: OP-3a, OP-3b
• SMPTE 408M: OP-1c, OP-2c, OP-3c

Generic containers:
• SMPTE 379M: Generic Container (the way that essence is stored in MXF files)
• SMPTE 381M: GC-MPEG (how to store MPEG essence data in MXF using the Generic Container)
• SMPTE 383M: GC-DV (how to store DV essence data in MXF using the Generic Container)
• SMPTE 385M: GC-CP (how to store SDTI-CP essence data in MXF using the Generic Container)
• SMPTE 386M: GC-D10 (how to store SMPTE-D10 essence data in MXF using the Generic Container)
• SMPTE 387M: GC-D11 (how to store SMPTE-D11 essence data in MXF using the Generic Container)
• SMPTE 382M: GC-AESBWF (how to store AES/EBU and Broadcast Wave audio essence data in MXF using the Generic Container)
• SMPTE 384M: GC-UP (how to store Uncompressed Picture essence data in MXF using the Generic Container)
• SMPTE 388M: GC-AA (how to store A-law coded audio essence data in MXF using the Generic Container)

Metadata, dictionaries and registries:
• SMPTE 380M: DMS1 (a standard set of descriptive metadata to use with MXF files)
• SMPTE 436M: MXF Mappings for VBI Lines and Ancillary Data Packets
• SMPTE RP210: SMPTE Metadata Dictionary (the latest version is available here.)
• SMPTE RP224: Registry of SMPTE Universal Labels

The AS-11 file must contain the metadata described in section 4.11 below.
Why specifications

- Standards enable world wide interoperability – thus more people /organisations can benefit - e.g Kit is cheaper
- Specifications make the fundamental standard more useful for a particular group.
- For TV production in the UK the DPP sets specification.
- If you are working in UK Production you need to be aware of this
- Student TV needs to also sets seem specifications to ensure that your programmes “work” in the system in your station.
- The less you need to think about technology – the more time you can think about being creative – BUT you need to think interoperable

www.smpte.org/uk

Metadata
THE BITS ABOUT BITS
Metadata basics

Content = Essence + Metadata

Audio Video etc. material

Text describing the Essence and / or its use

Two metadata Categories

Structural
Describes the technical format of the file itself, the audio and video essences, and the other metadata included with the file. Structural metadata is usually added automatically by systems which construct the file, and are relied on by systems which decode the file. It will include information about the compression codecs used and which audio tracks are present.

Descriptive
Descriptive metadata is usually added manually by the producer of the file. This includes information which will be read by the users of the file in order to identify the material and use the appropriate parts for further operations. It will include the titles and ID numbers for the programme, and the allocations of the audio tracks present.
**DPP tools**

**DPP Metadata application**, which is available for download from the DPP website (http://www.digitalproductionpartnership.co.uk/what-we-do/metadata-application-2/). This is an application which will allow entry and insertion of the metadata into the MXF programme file.

These must be done after all post-production is complete and the programme is ready for delivery to the broadcaster, as any changes to the file are likely to invalidate the metadata and cause the file to be rejected.

**DPP Metadata spreadsheet**, which is available here: http://www.digitalproductionpartnership.co.uk/download/minimum-metadata-set/

---

**Some Descriptive Metadata editorial**

<table>
<thead>
<tr>
<th>Metadata Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series Title</td>
<td>The final title of a grouping of publishable assets with sharing identification and branding linked by common characters, subject matter, style or story. This could be a series, serial or themed grouping.</td>
</tr>
<tr>
<td>Programme Title</td>
<td>The title of a Programme Version for a specific purpose. Note: This may change between the point of commission/production and final delivery from post production.</td>
</tr>
<tr>
<td>Episode Title/Episode No.</td>
<td>Final episode name and or number used to identify an individual episode.</td>
</tr>
<tr>
<td>Production Number</td>
<td>A unique number used to identify an individual Programme Version. Also known as Programme Number, Clock Number or Material ID.</td>
</tr>
</tbody>
</table>
**Synopsis**
Descriptive summary of the content of no more than 250 characters suitable to be utilised for EPG/billings purposes.

**Originator**
Company responsible for creating asset.

**Copyright Year**
Year in which the production was completed. Note: year only

**Other Identifier**
A unique code that can be used to identify a piece of content.

**Other Identifier type**
Description of other identifier, e.g. ISAN.

**Genre**
A genre categorising the whole asset.

**Distributor**
The name of the person or company/companies providing the content. May be a third party for secondary distribution rights.

---

**Time code**

<table>
<thead>
<tr>
<th>Time code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line Up Start</td>
<td>Timecode for start of line up test signals.</td>
</tr>
<tr>
<td>Ident Clock Start</td>
<td>Timecode for start of the initial ident or countdown clock.</td>
</tr>
<tr>
<td>Start of repeating group: Timecode</td>
<td>Identifier of the part.</td>
</tr>
<tr>
<td>Part Number</td>
<td>Total number of parts in the program.</td>
</tr>
<tr>
<td>Part Total</td>
<td>Timecode for the first frame of the part.</td>
</tr>
<tr>
<td>Part SOM</td>
<td>Duration of the part.</td>
</tr>
<tr>
<td>Part Duration</td>
<td>Total of all part durations, i.e. sum of all repeated group of part durations. Note: this is not a Track duration.</td>
</tr>
</tbody>
</table>
Contact

<table>
<thead>
<tr>
<th>Contact Email</th>
<th>The email address of the SPOC (Single Point Of Contact) for the use of the recipient regarding any delivery or technical issues encountered with the delivered file.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact Telephone No.</td>
<td>The direct telephone number of the SPOC (Single Point Of Contact) for the use of the recipient regarding any delivery or technical issues encountered with the delivered file.</td>
</tr>
</tbody>
</table>

What else is metadata

Content = Essence plus metadata

Metadata can be

- The script
- The notes and photos / video from the survey
- The camera script
  - Etc. etc.

MOSTLY TEXT ...... Which can be easily shared

......... So write things down (Electronically)

And index them – metadata on metadata!
Summing up

Programme makers (Non techies) need to know something about the technical side (and vice versa)

Specifications restrict what you can do - to aid interoperability – and thus reduce the technology that you need to know.

Metadata is an important part of the Production Workflow – it tells you what is the AV material (Essence) - without it – you have not got a programme / Clip / Item......

The DPP has specifications and background can help you understand what /why professionals use So that you can select the bits that work for your production

SMPTE in the UK

UK Section serving all who are working with the technology of moving pictures and associated sound & metadata – creatively, practically and innovatively in any format, and on any platform

One hundred years of serving the Industries of the Moving Image throughout the world by our Members Education Standards