Component-based Workflows and the IMF User Group

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Chairman, IMF User Group

UHD and HDR (ITU-R Rec BT.2100…)

Immersive sound (ITU-R Rec BS.2076, SMPTE ST 2098-2…)

Subtitles and Captions (EBU-TT-D, IMSC1, IMSC1.1…)

Expanding Essence Repertoire

TV

Mobile

Web

Multiple Viewing Experiences

Multiple languages

Multiple edits

Varying technical and metadata requirements

Global Content Platforms

COMPONENT-BASED WORKFLOWS

Taming the Content Version Explosion

Component-based Content

Components (metadata or essence)
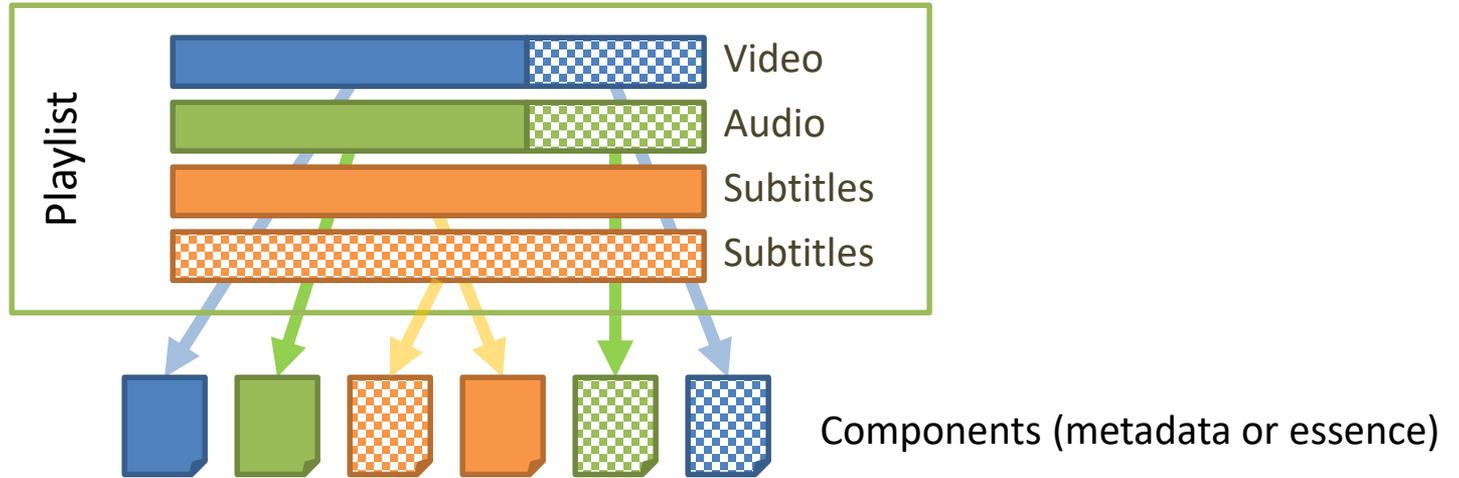
Reusable individual components are arranged on a common timeline by a playlist

Evergreen masters

Increased automation

More efficient QC

Lower barriers to worldwide distribution and acquisition

At the end of the road

High-quality, component-based interchange format

Worldwide standard developed by SMPTE

Initial publication in 2014

Established technologies (XML, MXF…)

IMF: one piece of the puzzle

IMF

#ispeakimf

Applications

SMPTE ST 2067-21 Application #2	SMPTE RDD 45
JPEG 2000 (UHD + HDR)	ProRes (UHD + HDR)
24-bit PCM audio	24-bit PCM audio
IMSC1 timed text	IMSC1 timed text

Applications tailor IMF to a specific domain while retaining 90% commonality between applications

Society of Motion Picture and Television Engineers (SMPTE)

European Broadcasting Union (EBU)

Digital Production Partnership (DPP)

North American Broadcasters Association (NABA)

Multiple organizations

Worldwide community of IMF end-users and implementers

90+ members large and small

Quarterly in-person meetings (w/ remote participation)

Next meeting @ NAB

IMF User Group

www.imfug.com

FIRST-HAND EXPERIENCES

Chris Fetner, Netflix

Greg Geier, SPE

Jack Wenzinger, AWS

Lucas Carboni, Fox Global Media Services

Why IMF for Netflix?

- Standardized and open format
- Global distribution requires versions
- IMF allows for efficient delivery and storage of versions
- Plugin mechanism supports addition of modern technologies like Immersive Audio

Japanese Version (CPL)

IMF at Netflix Today

- Most branded content delivered in IMF Application #2E
- Supplemental packages used to deliver and apply fixes
- Great support in mastering tools
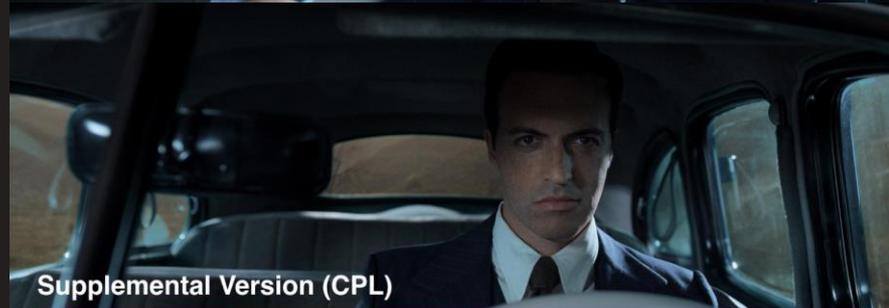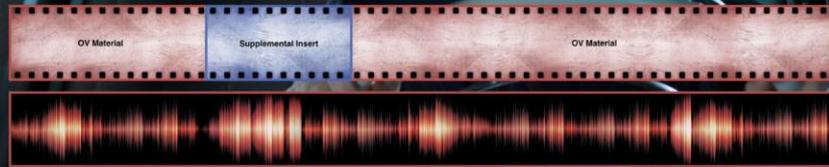
- 2012 – Initial development of UHD and IMF

- 2013 – Created 100 UHD (4K) Titles in one year

- 2014 – IMF catalog expanded into localized versioning

- 2015 – HDR IMF mastering pipeline implemented

- 2016 – Delivered first UHD HDR BD title

- 2017 – All SPE new release feature adopted HDR

- 2018 – SPE TV 25+ series shows mastered in HDR

SONY IMF INVENTORY - OVERVIEW

Type	Creation (avg)	Inventory
All IMF	51 / week	13,278
OV Master IMF	21 / week	5,410
Localized IMF	30 / week	7,868
HDR	11 / week	1,552
SDR	40/ week	11,726

720 Feature Titles
- 142 Features in HDR

78 Series with 2017 Episodes
- 29 Series with 481 Episodes in HDR

Master Metadata Global availability between GMDM, IMF & EIDR

Jack Wenzinger   Solutions Architect, M&E Vertical

Key Considerations

- **A Place for my Stuff**
  - Content Lakes
  - Security
  - Machine Learning Metadata

- **Simple Scaling**
  - Micro Services, Elastic Architectures
  - Opportunistic Compute (Spot)
  - Serverless

- **Integration and Innovation on Tap**
  - Large ecosystem of technology providers improving service potential
  - Quickstarts like Media2Cloud, Serverless Ingest Framework
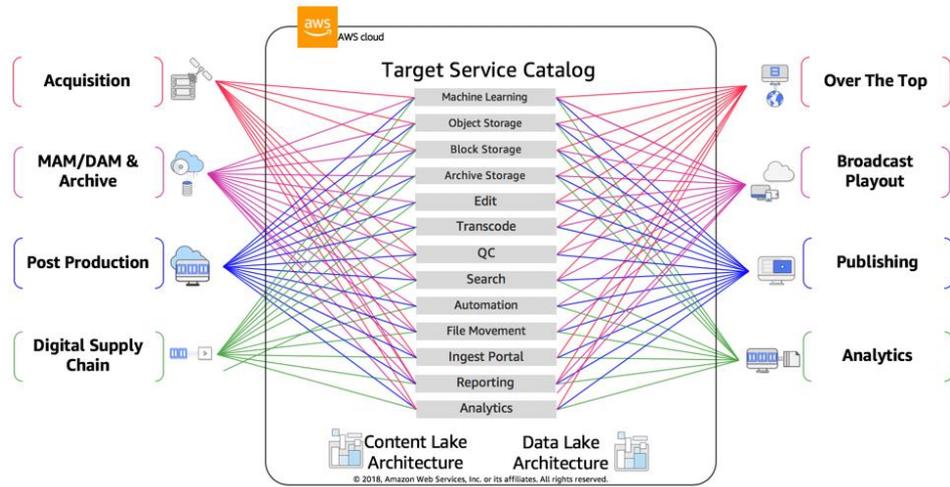
Fox Global Media Services

Lucas Carboni - SVP, Media Strategy and Integration

Main Media Manufacturer for 20th Century Fox

- Hundreds of thousands of deliverables manufactured annually

- 45 TV series and 20 Features produced annually

- 50K Titles managed

TV and Feature Content for All Markets

- 2,300 Platform and Broadcast Customers

- 194 Countries

- 63 Languages

6000+ UHD IMF Compositions

- Feature Films and TV
- HDR and SDR
- Lossless Masters / Compressed Servicing
- Over 1.5PB of data

1300 Titles on Movies Anywhere

- Feature Films
- Manufactured, packaged, delivered as components
- UHD IMF Delivery using MovieLabs

On The Horizon...

- **IMSC 1.1 Text Support – Japanese & HDR**
- **Immersive Audio Bitstream in IMF**
- **SMPTE ST 2067 IMF Document Revisions**
- **Automated Forensic Watermarking of IMF**