SMPTE CONFERENCE 2016 ULTRA HD FORUM ITALIA Beyond Definition

Emerging Technology
SMPTE Seminar
8th edition
one century of international standards

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COMUNICAZIONE E TECNOLOGIE
OLTRE LE FRONTIERE

Interoperable **M**aster **F**ormat:

The Cinema and Multimedia bridge

Sean Dukin, Engineer Media Engineering, Netflix

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Vatican City ~ October 7, 2016

Interoperable Master Format

The Cinema and Multimedia bridge

Sean Durkin - Netflix
Engineer, Media Engineering & Partnerships

Contents

- What is IMF
- Structure Of A Package
- What problem are we trying to solve?
- Benefits
- Potential Real World Applications

What is IMF?

Open Standard:

- SMPTE
- Derived from Digital Cinema Initiatives (DCP) standards
- Supports JPEG2000
- Core Framework
  - Concept of “Essences” / “Compositions”
- Modular Applications
  - App #2 (Extended)

What is IMF?

Looking To The Future:

- Future proofing content
  - 4K DCI
  - High Dynamic Range
  - Wide Color Gamut
  - High Frame Rate
  - IMSC
- Format is in the wild right now
  - Netflix “format of choice”

Structure

Essences

- Video
  - Main Program + Differential Frames
- Audio
  - Original Audio + Additional Dubs
- Timed Text
  - Foreign Lang + Hard of Hearing

Track Files

- MXF Wrapped

Structure

Composition Playlist (CPL)

- Set of Instructions
  - Human Readable XML
  - References Track Files
  - UUIDs
- Flexible
- Non-destructive

Structure

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Structure

Output Profile List (OPL)

- Set of Instructions
  - Human Readable XML
  - References CPLs
  - UUIDs
- Automation
- Studios defined parameters
  - Reliable/Consistant Outputs

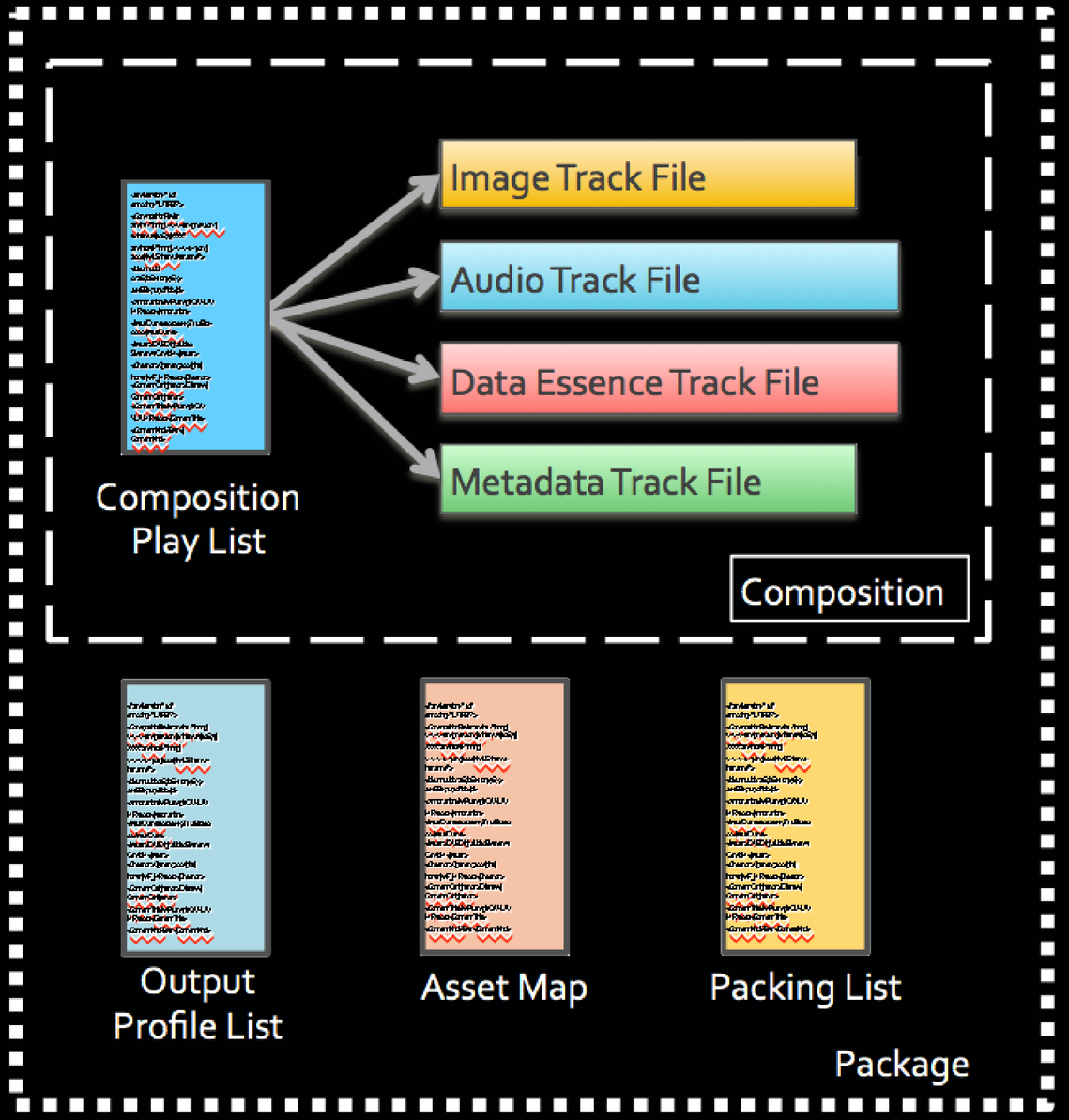
Structure

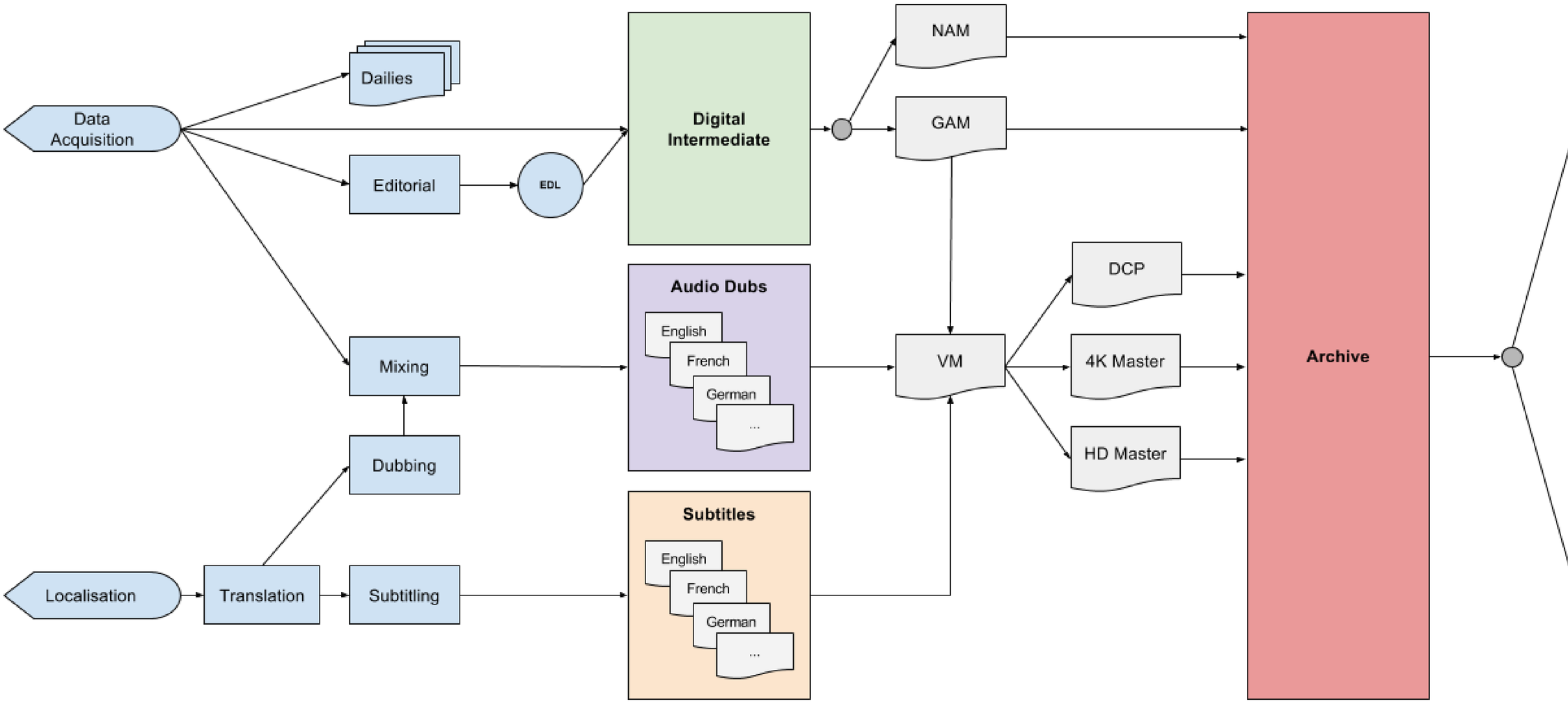
A Composition Includes:

- CPL
- Multiple Track Files

A Package Includes:

- Composition
- OPL
- Asset Map
- Package List

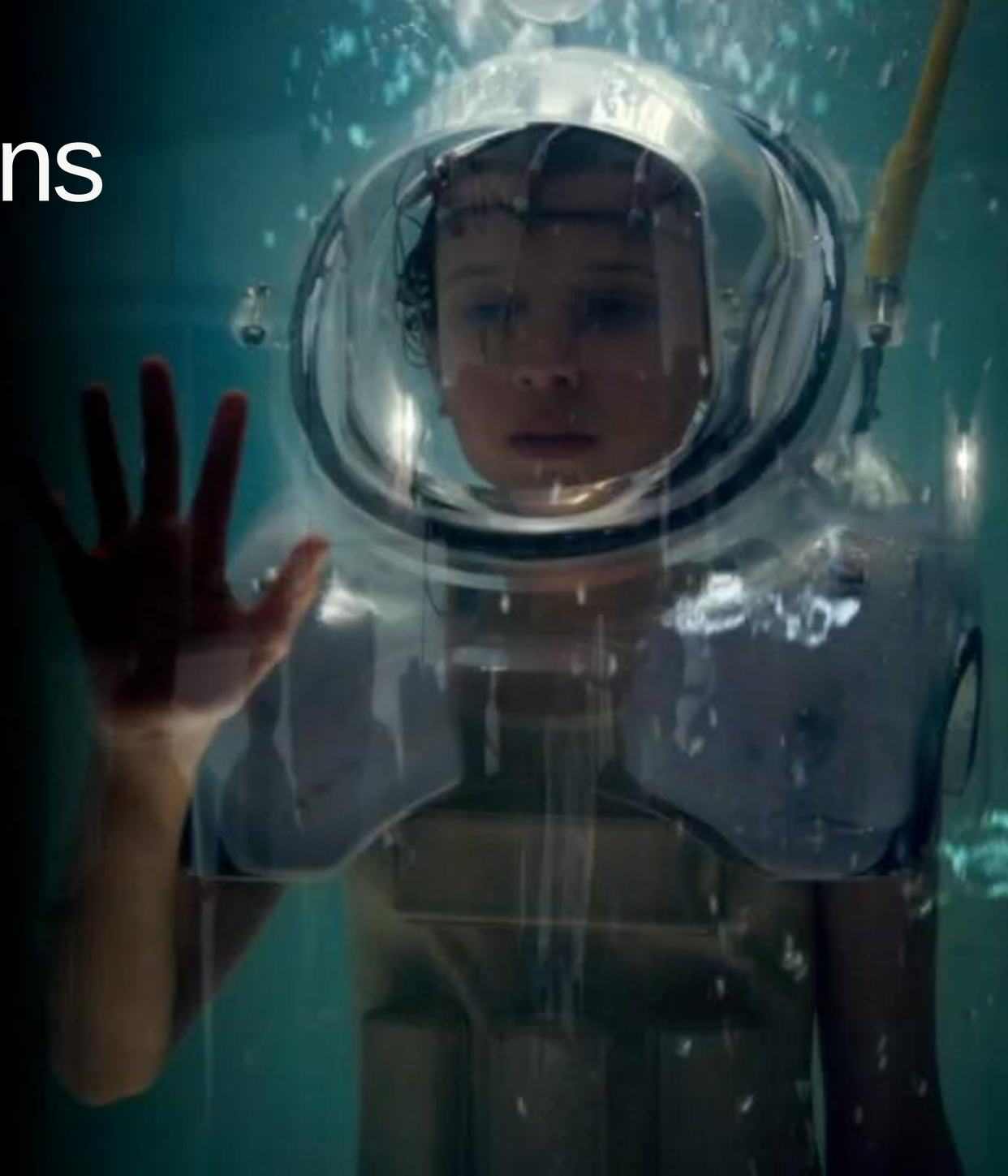



Data Acquisition
Dailies
Editorial
EDL
Digital Intermediate
NAM
GAM
Mixing
Audio Dubs
English
French
German
...
VM
DCP
4K Master
HD Master
Archive
Dubbing
Localisation
Translation
Subtitling
Subtitles
English
French
German
...

Drowning in Versions

The Challenge

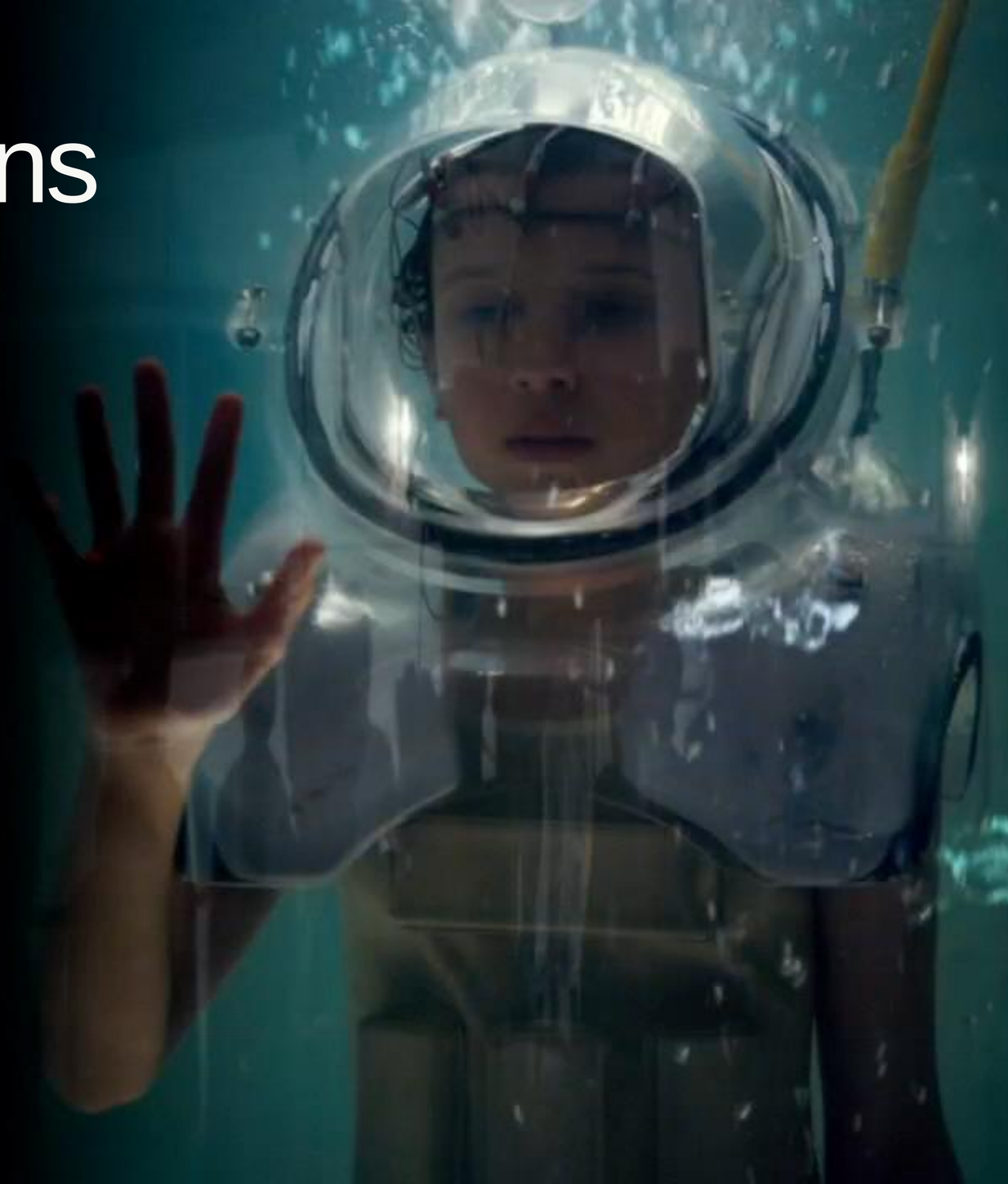
- Creatively Localised Versions
  - Graphics / Audio / Subtitles
- Censored Versions
  - Blurring Elements
  - Scene Removal
- Compliance Requirements
  - PSE Correction



Drowning in Versions

Feature Film Example:

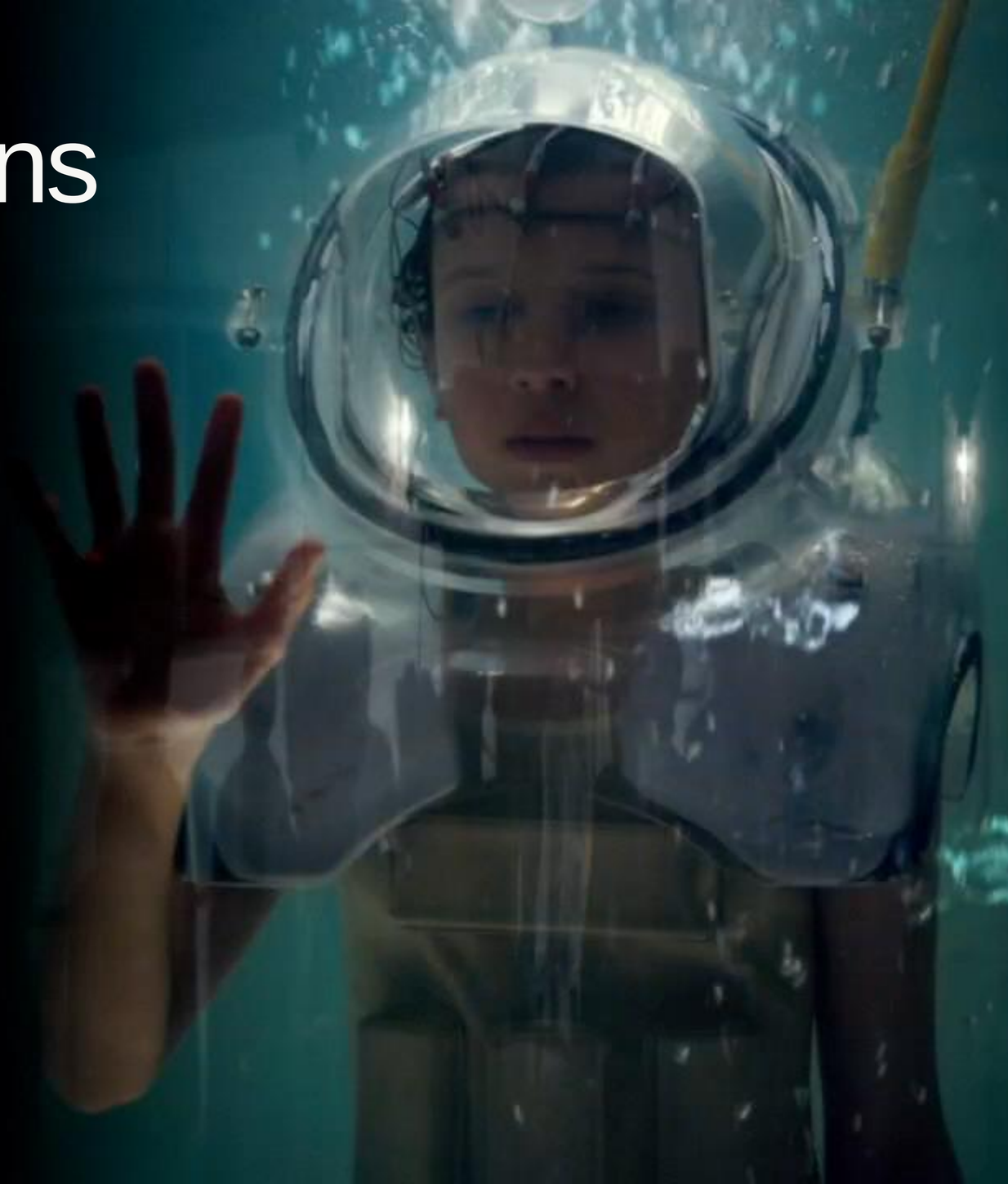
- **Duration:** 90 Minutes
- **No. Localised Versions:** 12
- **Deliverable:** HD ProRes 422 HQ
- **Total Video (ProRes):**
  - ~1.4 TB of data
  - ~27 hours of QC
- **Total Video (IMF):**
  - ~200 GB

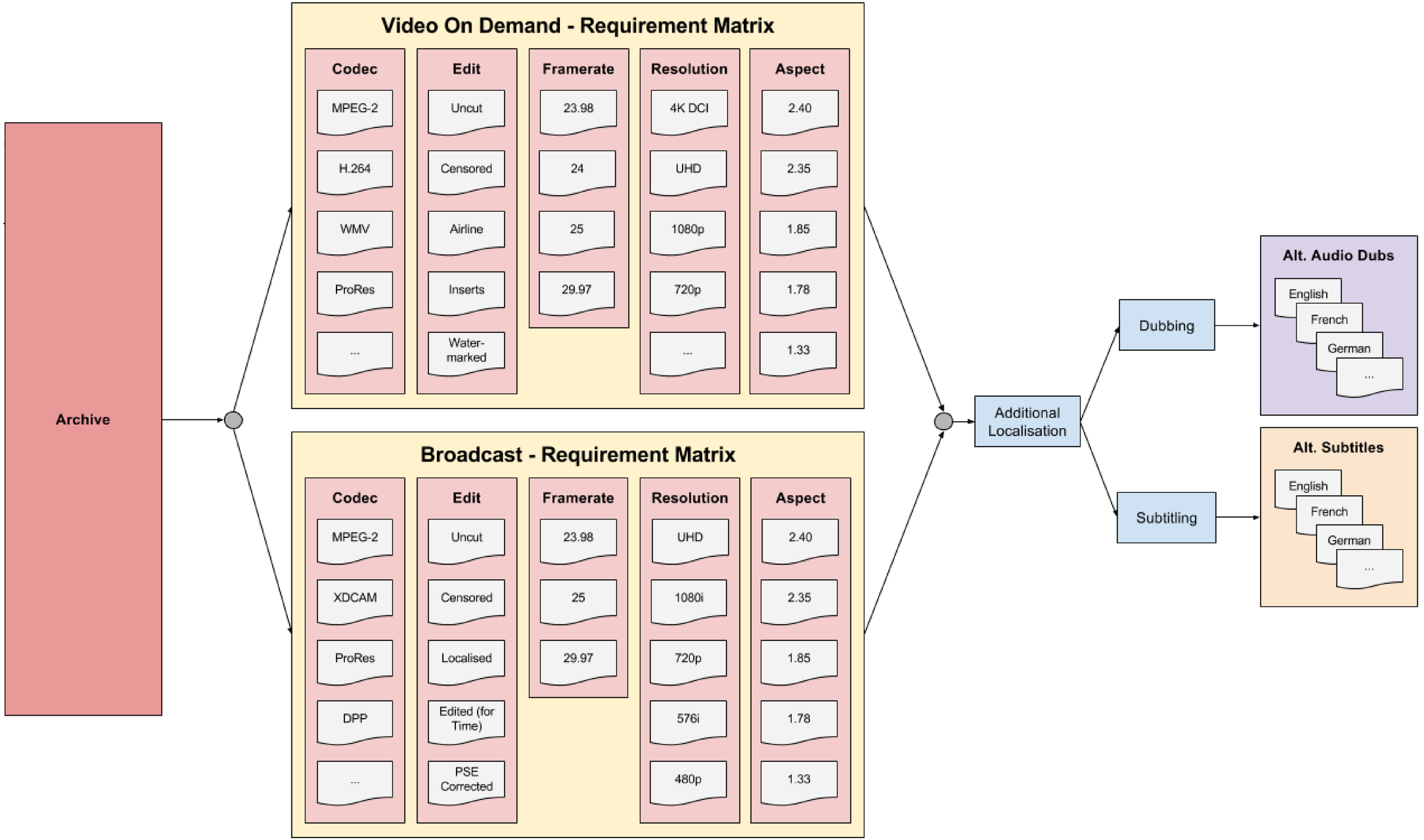


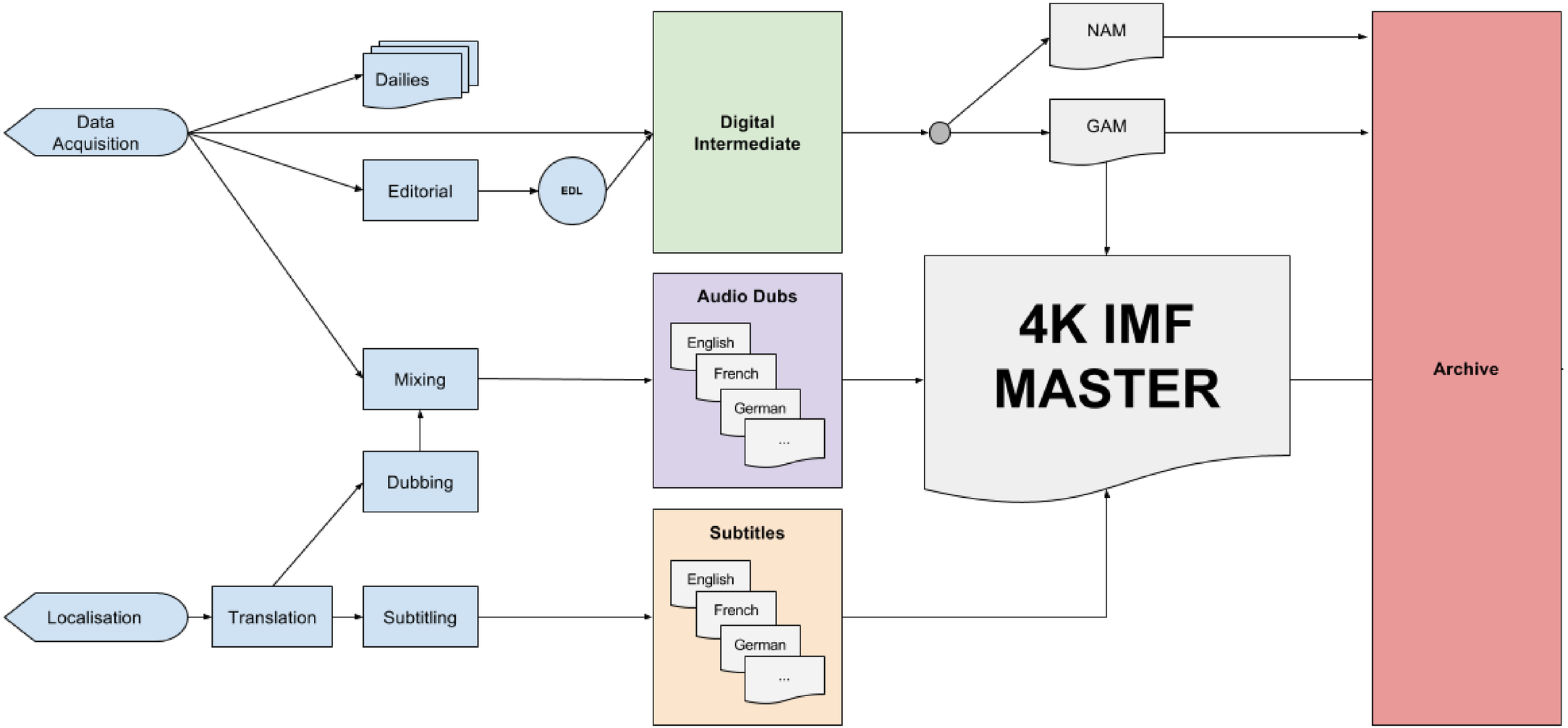
Drowning in Versions

TV Show Example:

- **Duration:** 50 Minutes
- **No. Episodes:** 13
- **No. Localised Versions:** 12
- **Deliverable:** HD ProRes 422 HQ
- **Total Video (ProRes):**
  - ~10 TB / 156 Videos
  - ~194 hours of QC
- **Total Video (IMF):**
  - ~3 TB




Video On Demand - Requirement Matrix
Codec
MPEG-2
H.264
WMV
ProRes
...
Edit
Uncut
Censored
Airline
Inserts
Water-marked
Framerate
23.98
24
25
29.97
Resolution
4K DCI
UHD
1080p
720p
...
Aspect
2.40
2.35
1.85
1.78
1.33
Archive
Broadcast - Requirement Matrix
Codec
MPEG-2
XDCAM
ProRes
DPP
...
Edit
Uncut
Censored
Localised
Edited (for Time)
PSE Corrected
Framerate
23.98
25
29.97
Resolution
UHD
1080i
720p
576i
480p
Aspect
2.40
2.35
1.85
1.78
1.33
Additional Localisation
Dubbing
Subtitling
Alt. Audio Dubs
English
French
German
...
Alt. Subtitles
English
French
German
...


Data Acquisition
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4K IMF MASTER
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German
...

IMF Versioning

Antidote to “Versionitis”

- Multiple essences in a package
- Multiple compositions in a package
- Differential Frames
- Master Once -> Deliver to Many

CPL: OV

Video: OV

Audio: OV

Subtitle: OV

IMF Versioning

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- Multiple essences in a package
- Multiple compositions in a package
- Differential Frames
- Master Once -> Deliver to Many

CPL: JPN

V: JPN Open		V: JPN Diff1		V: JPN Diff2		V: JPN Diff3		V: JPN Credits
Audio Dub: JPN								
Subtitle: JPN								

IMF Versioning

Antidote to “Versionitis”

- Multiple essences in a package
- Multiple compositions in a package
- Differential Frames
- Master Once -> Deliver to Many

CPL: CHN

V: CHN Open		V: CHN Diff1		V: CHN Diff2		V: CHN Credits

AudioDub: CHN

Subtitle: CHN

Real World Applications

Use Case:

- High Dynamic Range
  - Increased contrast and brightness
- Increased color gamut
  - P3, Rec.2020
- Gap between “Theatrical” and “Home Entertainment” narrows.

Real World Applications

Use Case:

- Localising the experience
  - Repurposed Video Master
  - Supplemental IMPs
    - Blurred Content
  - Minimal overhead

Real World Applications

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- Localising the experience
  - Repurposed Video Master
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Real World Applications

Use Case:

- Supplement Corrections
  - Issues can still occur
  - Focused corrections
  - Efficiency is optimised
  - Reduced redundancy

Real World Applications

Use Case:

- House of Cards: Season 3
  - All assets mastered and ingested
  - Netflix Ident Update
    - 1 x A / V MUX Asset per episode
    - 15 x Audio Dubs per episode
    - 19 x Timed Text Assets per episode
    - Total Assets: 455

Thank you