

# Post-Production Workflow for Stereo Productions

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# About this presentation

- **Introduction to DVS and PRIME**
- **Overview on typical Film post-production workflows**
- **Where is special handling needed for 3D post-production?**
- **DVS approach, status and plans**

# Introduction: DVS

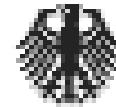
- **Full name: DVS Digital Video Systems AG**
- **German Manufacturer of**
  - **Video I/O and Processing Boards**
  - **Video Workstations**
  - **SAN and NAS based Storage Solutions**



# Introduction: PRIME



Supported by

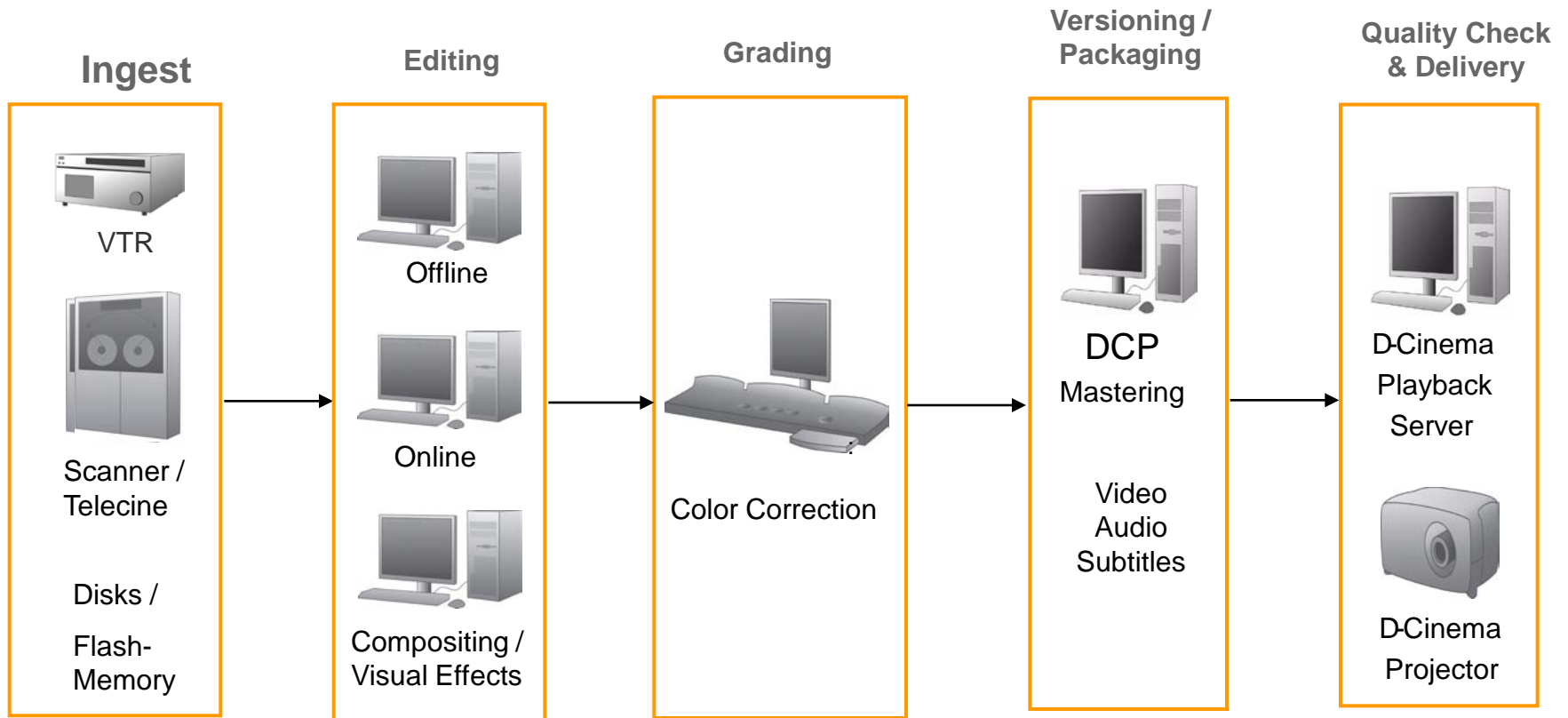


Federal Ministry  
of Economics  
and Technology

## DVS Focus:

- Post-production of stereoscopic 3D film
- Use of depth information

# Simplified Post-Production Workflow



# Ingest: Flip and Flop

Left



Right



# Ingest: Left/Right Clip Matching

Left



Right



# Ingest: Left/Right Color Matching

- **Compensation of small differences between the cameras**
- **Manual compensation with color correction tools**
- **Supported by histograms and vectorscope images**
- **Automatic compensation should be possible**

# Ingest: Left/Right Image Rectification

- **Correction of distortions in the stereo geometry by**
  - **Vertical shift**
  - **Rotation**
  - **Zoom**
  - **Warping**

# Grading: Depth Grading

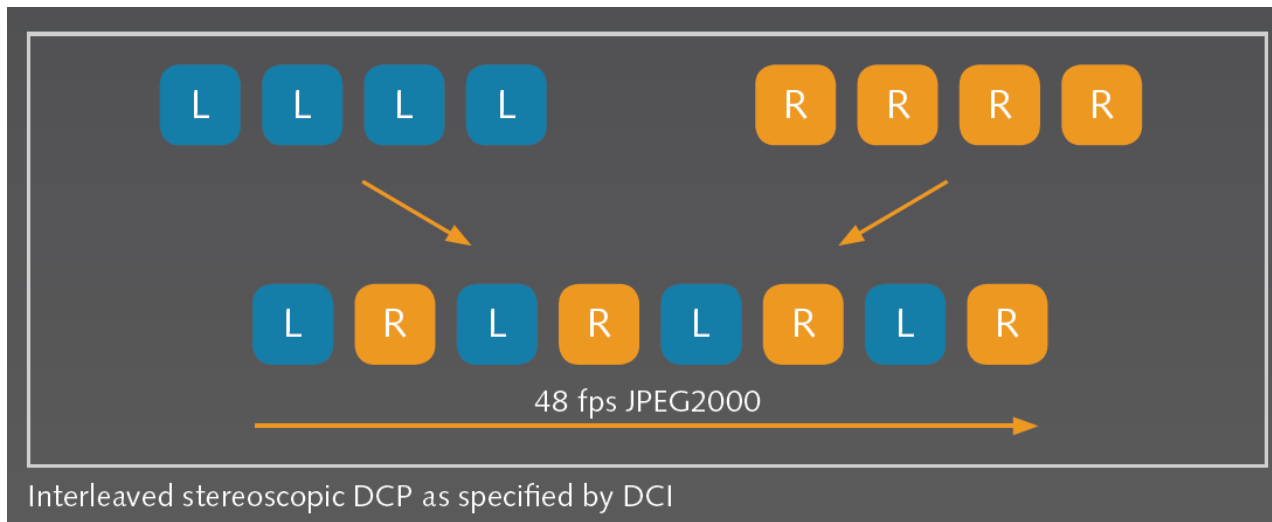
- **General adjusting of scene depth**
- **Special emphasis on cuts and transitions**
- **The aim is to avoid sharp changes in the depth of the 3-D point of interest**
- **Usual implementation as Shift and Zoom**
- **Operator should be supported by parameters like**
  - **Depth range**
  - **Average depth**
  - **Center depth**

# Versioning: Ghostbusting

- **Elimination of cross-talk between left and right eye images**
- **Cross-talk depends on projection technique**
- **Ghostbusting = subtracting the estimated cross-talk**
- **Specific DCP versions were needed**
- **Now replaced by projection-side solutions**

# Versioning: 3D DCP Mastering

- Only two differences to 2D DCPs:
  - Frame rate
  - Max. bit size per frame

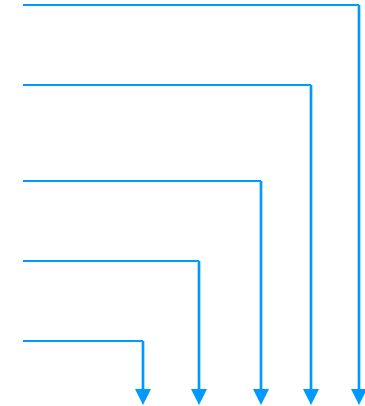


# Versioning: 3D Subtitles

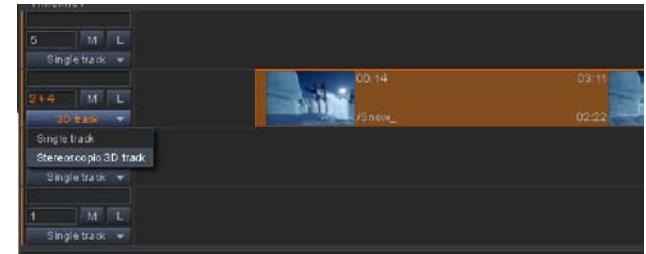
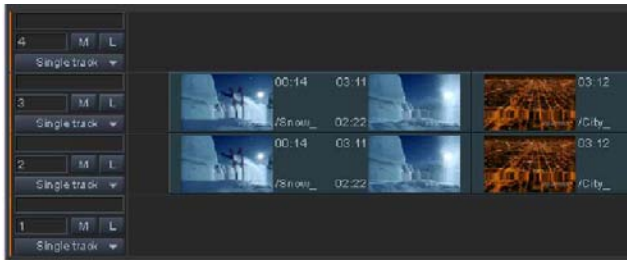
- Subtitles on a single screen plane of a stereoscopic movie are not visually pleasing the audience
- What seems to work best is to position the subtitles slightly in front of the 3-D point of interest in any given scene
- This allows the audience to easily read the subtitles without refocusing
- Currently all subtitles in 3D films get burned in before mastering
- That means: Multiple versions need to be created
- Doremi recently proposed an extension of the DCI subtitle format to add a Z-value to each subtitle string
- Semi-automatic placing should be possible

# DVS Platform: CLIPSTER

- **Digital intermediate** (Telecine, disk-to-disk color correction)
- **Conforming** (creating high-resolution online-master bis zu 4K)
- **Finishing** (uncompressed color grading in real 16 bit quality)
- **Versioning and Mastering** (any Video and File format)
- **Dailies** (real-time deliverables und rushes)



# DVS Status: Stereoscopic Timeline

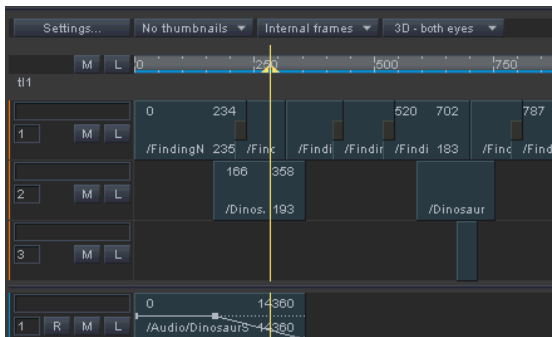


- **Allows Editing of stereoscopic content**
- **Provides Operators for**
  - Color correction
  - Pan and Scan
  - 3D-LUTs
  - BurnIn
- **Separate handling of left and right channel prepared**

# DVS Status: DCP Mastering

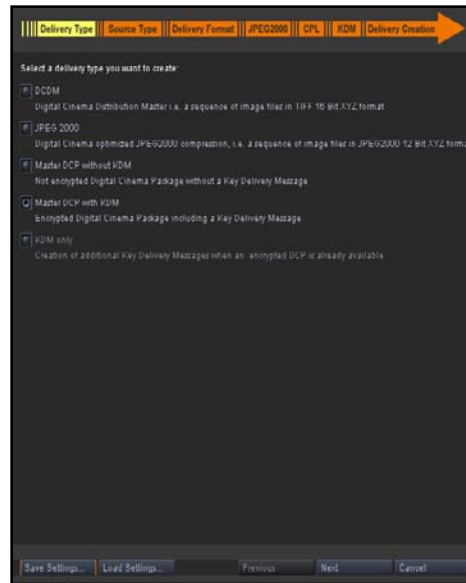


# DVS Status: 3D DCP Mastering



**Comfortable  
stereoscopic  
Timeline**

+



**Easy to use  
Wizzard**

+



**Hardware  
Acceleration**

# DVS Plans: Next steps

- **Integration of HHI technology for stereoscopic image analysis**
- **Use of analysis results for**
  - Automatic image rectification
  - Placing of Subtitles
  - Support of depth grading
  - Compositing
  - Improved masks for secondary color correction

Thank you!