



# Automated SDR/HDR Conversion

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# Why Automation?

- Creative intent best expressed in HDR
- Normalization of mixed sources
- Multiple transfer functions & Color Spaces
- Multiple display targets – rising peak nits
- Live events/sports
- Efficiency
- More consistent results than manually assisted?

# Factors determining High Quality Viewing Experience with HDR10

- HDR/SDR capture quality
- Mastering processing
- Critical first-stage tone mapping to HDR10
- Remastering quality from legacy content
- Inverse tone-mapping quality
- HDR TV internal processing quality
- Multi-peak tone-mapped vs Dynamic metadata

# Dynamic Metadata

## → Live events

- › Scene based – indeterminate delays
- › Per-frame flicker

## → All TVs must work without metadata anyway - HLG

## → Existing TVs must also be supported

## → Error-prone if re-processed/converted

## → Verification and maintenance nightmare

## → Specific algorithms associated

## → Massive changes required

## → **Costs matter in the end** - not practical for massive legacy and on-going content upconversion and in mixed production

# Automated SDR to HDR

## → What to expect viewing on latest HDR displays?

- Creative intent
- Expanded dynamic range
- Expanded color gamut

## → High quality processing for immersive HDR

- Dark details?
- Contours?
- Noise?

## Artifacts – nowhere to hide!

- Flicker, banding, halos, motion judder, blur, residual interlace

# Automated HDR to SDR+ Tone Mapping

- HDR cameras + production:
  - Simpler for live events?
  - Express creative intent?
- SDR+ optimally preserves HDR detail
- Improved viewing on SDR devices
- Preserve creative intent?
- Any input transfer function or color space
- Any peak luminance level
- Dynamic input metadata?

# Live Applications

- GPU acceleration
- On-the-fly conversion – IP or SDI
- SDR to HDR
- HDR to SDR+
- UHD 60p
- Detail-preserving scaling

# Conclusions

- SDR to HDR and HDR to SDR+ conversion optimized for:
  - ✓ any transfer function
  - ✓ any colorspace
- The flood-gate to automated high-quality SDR/HDR conversion is about to be lifted!
- See live demonstration at our booth



# Acknowledgements

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→ <https://hdr-2014.hdm-stuttgart.de/>

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