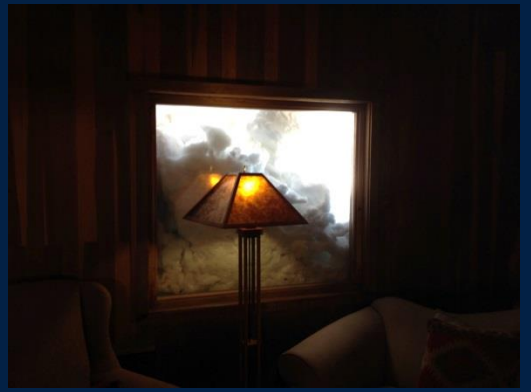
HDR Seminar (Live Presentation)

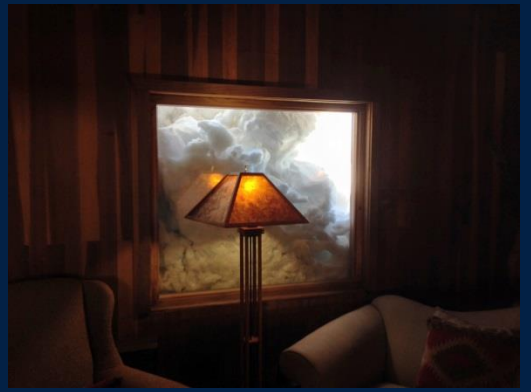
3/24/2016

What is High Dynamic Range (HDR)?

- Reproduces a visual system familiar in everyday life
- Allows increased luminance for brighter whites and greater contrast
- Uncompressed highlights (details we didn't even know we're missing!)
- Enhancing content by making better pixels, not more…



SDR



HDR

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Why is HDR Significant?

- Greatest imaging advancement since the SD to HD transition
- Archival; future proofing content in preparation for more advanced imaging techniques
- Our industry is catching up to consumer world; photography, tablets, smartphones already support HDR image systems

What is NOT High Dynamic Range?

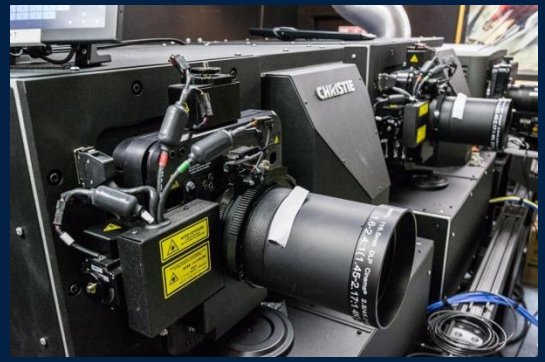
- UHD and HDR are different concepts
- Ultra High Definition (UHD): Requires an aspect ratio of 16:9 with a resolution of 3840 x 2160, or 7680 x 4320 pixels - No enhancement to image dynamic range
- The UHD Alliance is adopting branding to differentiate between UHD and UHD + HDR

Flavors of HDR: PQ (Perceptual Quantizer)

- PQ is a Dolby developed tone curve; adopted by SMPTE (ST2084)
- PQ system requires playback and display device to have compatible characteristics (dynamic metadata!)
- PQ's highest image value defined to be 10,000 nits, or 2918 fL; the brightest white the display can emit
- Since no monitor or projector can hit 10,000 nits, specific output level trim passes, such as 1000nit versions are requested based on type of displays available

Flavors of HDR: Dolby Vision

Dolby has created a high-end theatrical experience that incorporates HDR viewing with laser projectors + Atmos sound reproduction in upscale cinema houses branded as Dolby Vision.



For home deliverables, Dolby Vision captures color metadata from grading sessions and applies correction inside consumer's monitor of any luminance output; i.e., content mastered between 1,000 - 4,000nits could be optimized for any number of different Dolby-licensed monitors.

Flavors of HDR: Hybrid Log Gamma(HLG)

- The BBC and NHK (Japanese & British broadcasters) are promoting an alternative to the SMPTE/Dolby PQ curve

- Applies a different curve at the playback device to create a traditional tone curve for the low lights and a gentle curve at the top to preserve highlights; results in more dynamic range

- Production can use existing standard dynamic range (SDR) infrastructure and monitoring displays

Flavors of HDR: Other HDR Ecosystems

- Philips/Technicolor HDR; based on similar methodology of Dolby Vision - metadata carries from source to display device, based on difference between HDR and SDR)

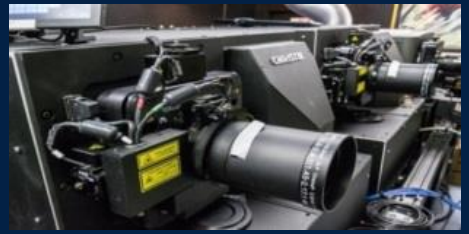
- Samsung HDR; working on a semi-automatic process to create SDR from HDR on display device

- Gap exists between standards and distribution for HDR, enabling a format war between manufacturers and technology






HDR Current Workflow



Trim with PQ tone curve on output for cinema luminance levels

Trim with PQ tone curve on output for video luminance levels

DCI P3 Hero Grade

14fl or ~48nits

HDR Dolby Cinema P3 D65

30fl or ~108 nits (2d)
14fl or ~48nits (3d)

HDR Home Entertainment using Dolby, Samsung, Sony, LG, Panasonic, or Vizio, display monitors, P3 or Rec709

300fl – 1100nits or ~1000-4000-nits

If Cinema version is not required, skip to home entertainment/broadcast mastering

HDR Marketplace

- Features – Tent pole and some mid budget shows are finishing in HDR right now

- Over The Top (OTT) – Internet content providers are currently adopting UHD and HDR content for original television, feature programing and to enhance their download catalogue library

NETFLIX VIDITY vudu MGO PREMIUM Movies + TV amazon studios hulu

HDR Marketplace

- Professional cameras are optimized for HDR with high resolution and high bit depth capture; *but you can't benefit from HDR unless mastering in HDR*


- Commercials – Moving to internet outlets for main distribution, but slow to adopt HDR due to consumer awareness

- Television –Traditional broadcast slow to adopt beyond HD; some studios are requiring UHD (4K) deliveries to satisfy future objectives; next steps will include live HDR

HDR Titles Completed

HDR Agenda

- Driven by electronics manufacturers; next evolution of HD and UHD, broadcasters refer to this as ‘enhanced HD’
- Moving beyond 4K UHD; not just about number of pixels, it’s about enhancing content, making better Pixels!
- First consumer TV’s hitting the market now; global HDR TV shipments to exceed 32 million in 2019; Cost of HDR displays barrier to entry for now
- Theaters equipping now with Dolby Vision; 20 globally and opening new installations every month

Planning Ahead

- Retooling the entire display chain from acquisition to archive; adopting HDR from dailies to finish (post workflow understood, onset, editing and vfx are next challenges)

- Adopting an HDR consumer standard; UHD Alliance is developing a uniform specification for HDR distribution known as HDR-10 (10bit delivery at 1,000nits for Internet and BluRay distribution)

Planning Ahead

- Consumer understanding of HDR vs. UHD; confusion in the marketplace
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branding required to indicate a true HDR display device
- Backwards compatibility; distributing HDR content while simultaneously satisfying UHD 4K and traditional Rec709 HD


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