

Dynamic Metadata

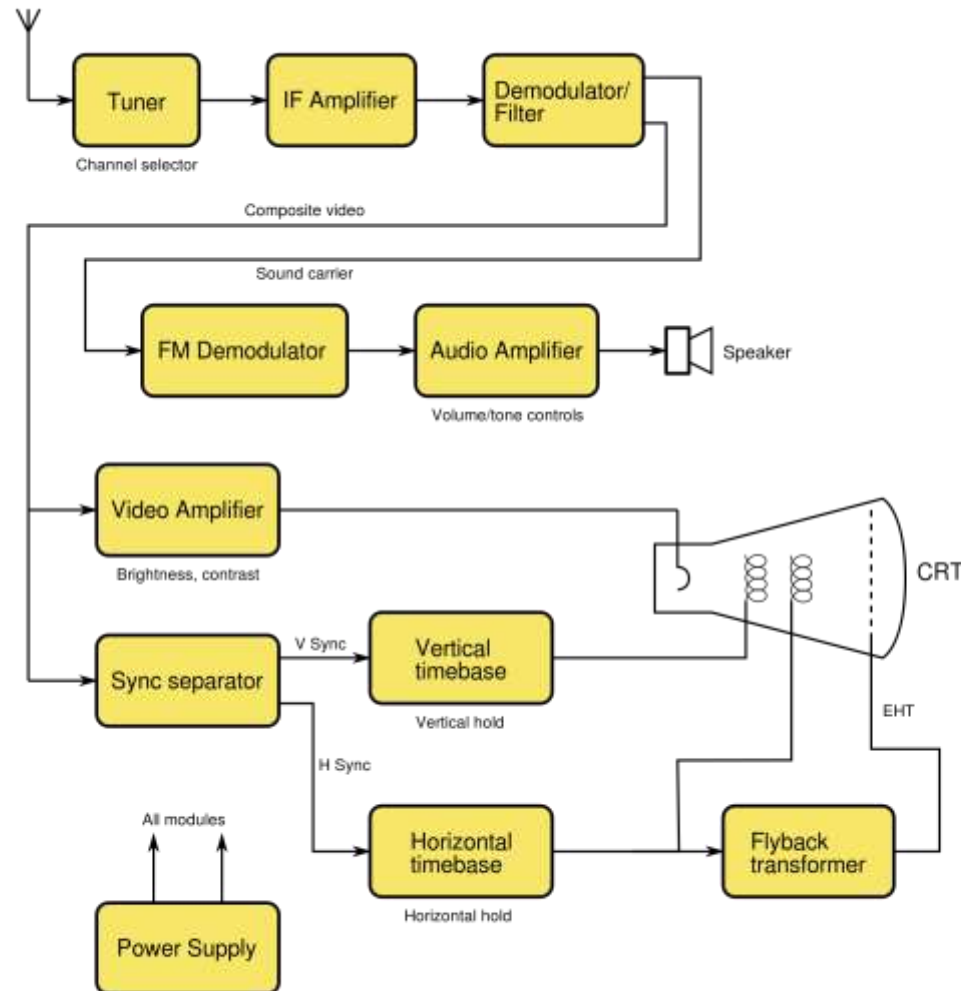
Lars Borg, Principal Scientist, Adobe

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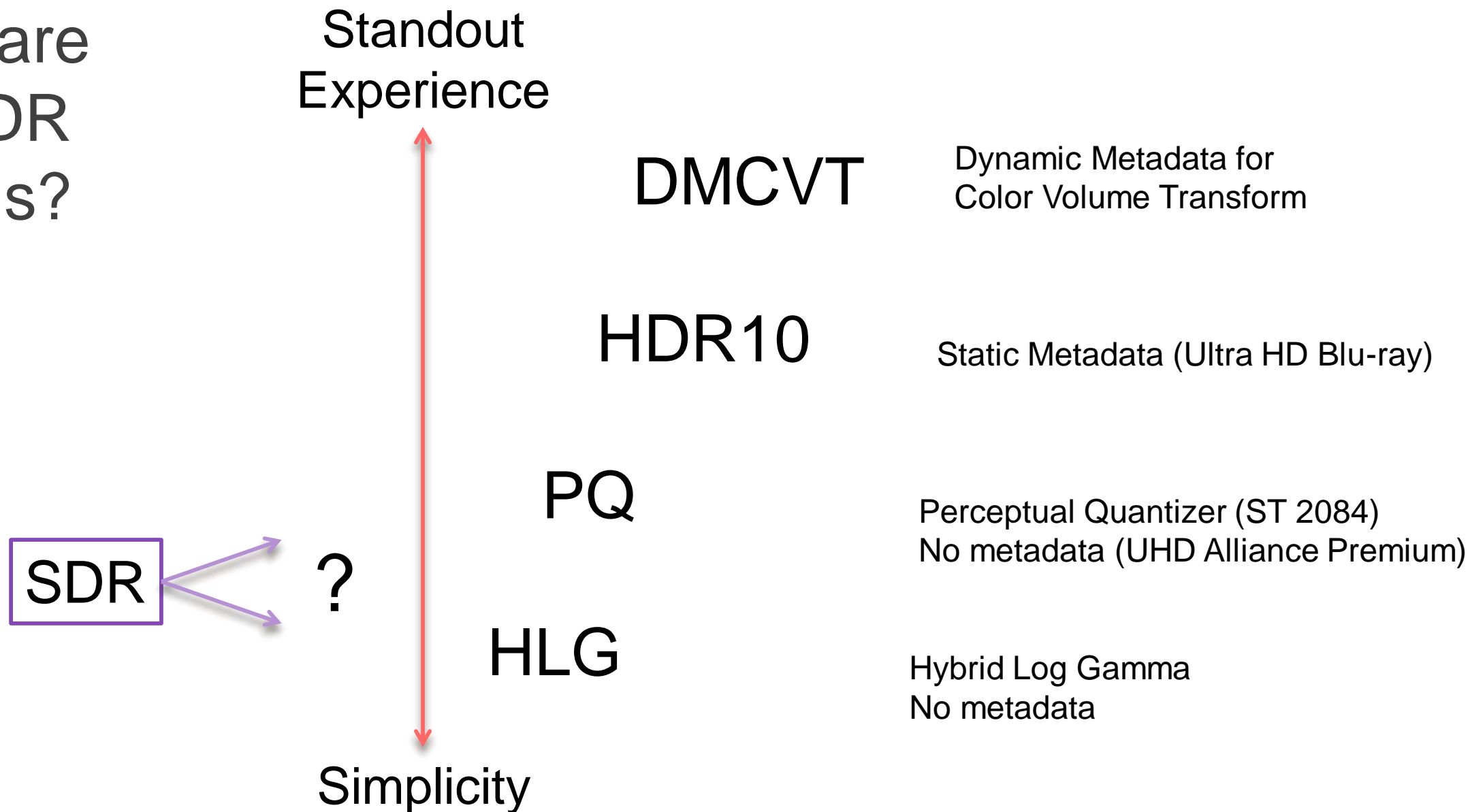
Dynamic Metadata

Lars Borg
Principal Scientist
Adobe



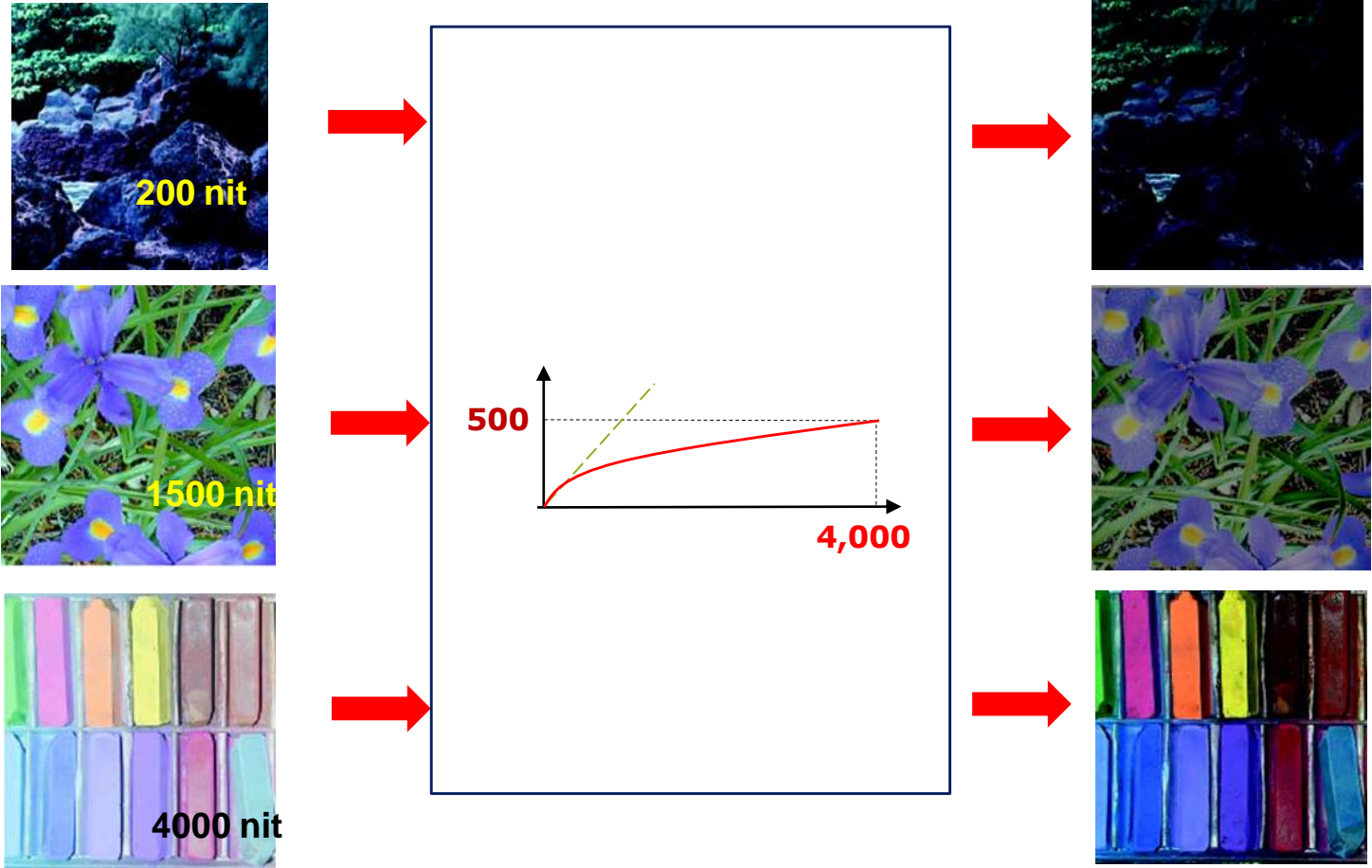
My first TV

What are my HDR options?



Static Tone Mapping – HDR10

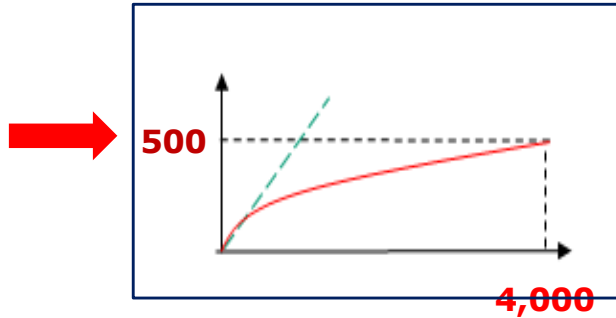
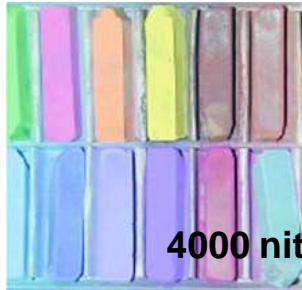
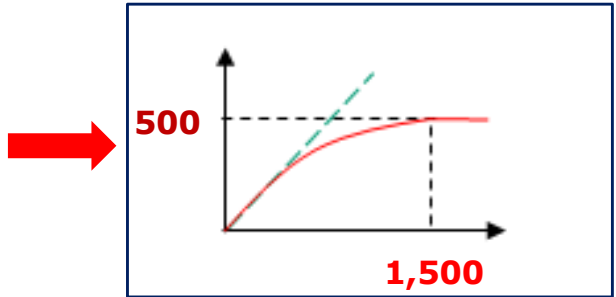
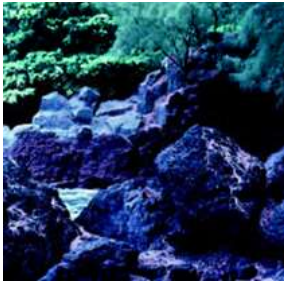
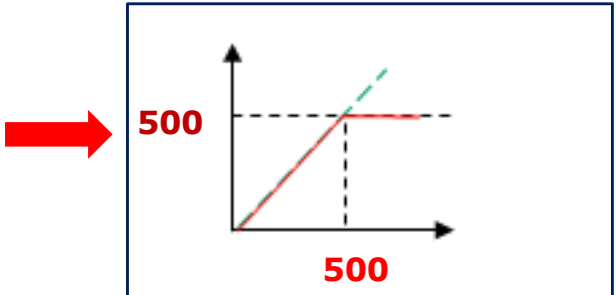
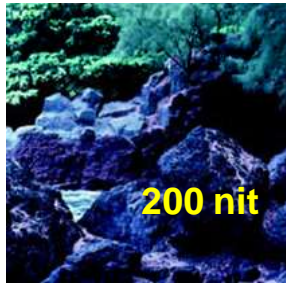
Optimized **only for the brightest scene** in the contents



Illustrations courtesy of YT Kim, Samsung

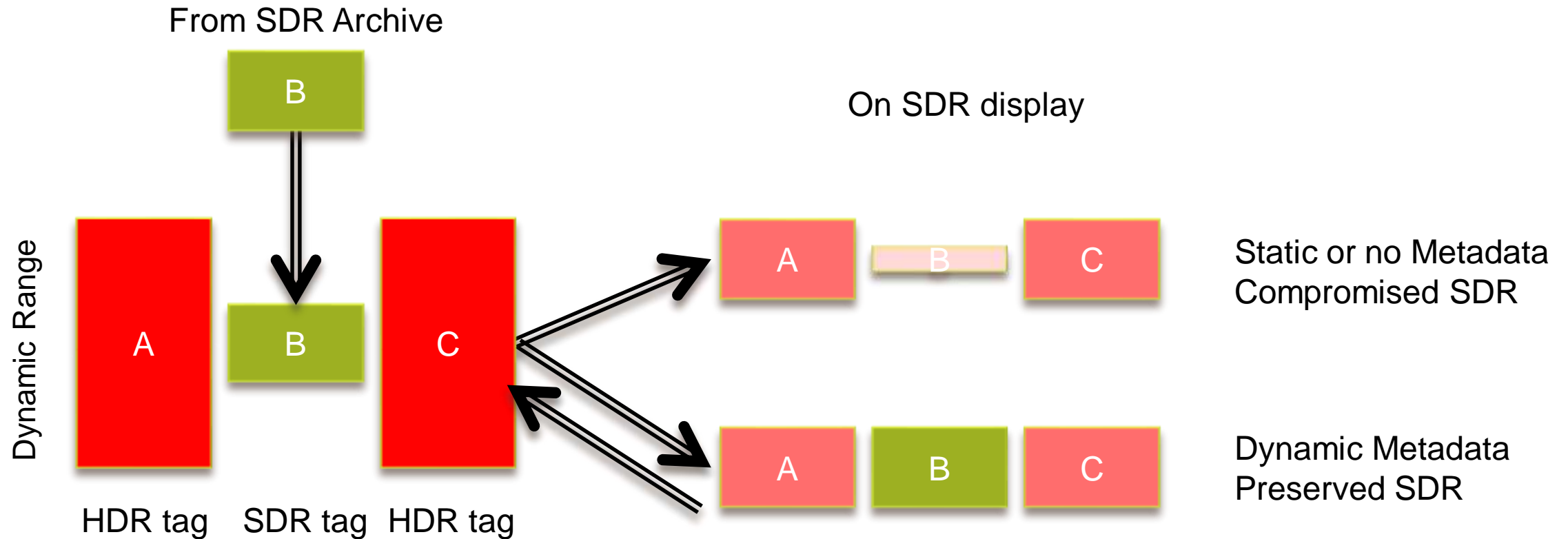
Dynamic Tone Mapping – DMCVT

Optimizes each scene



Dynamic Tone Mapping can preserve SDR image quality

- SDR footage inserted in HDR program needs special handling when converting to SDR
 - To preserve original SDR imagery and prevent loss of image quality
- Dynamic Metadata provides the info




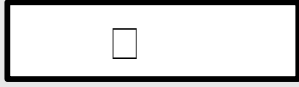
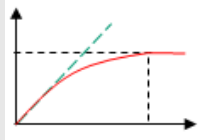
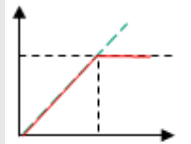
Dynamic Metadata for Color Volume Transforms (DMCVT)

- Color transforms optimized for each scene, and each display
- SMPTE ST 2094, in six parts, published 2016
 - Carried in HEVC SEI, ETSI TS 103 433, CTA 861-G (coming)
- Standardizes HDR color transform technologies from
 - Dolby (Parametric Tone Mapping)
 - Philips (Parameter-based Color Volume Reconstruction)
 - Technicolor (Reference-based Color Volume Remapping)
 - Samsung (Scene-based Color Volume Mapping)
 - And 80 other participating companies



Common DMCVT concepts

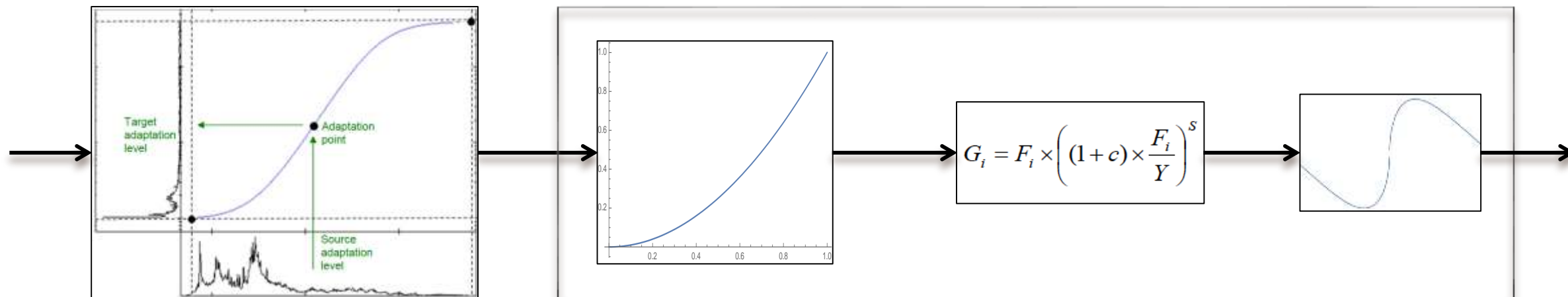
Each DMCVT metadata set specifies one of each of:

<i>Method</i>	<i>Target Display</i>	<i>Time Interval</i>	<i>Window</i>	<i>Transform</i>
Which?	For what display?	When?	Where?	What to do?
App #	Rec. 709 Rec. 2020 UHDA OLED	← □ □ □ □ □ □ □ → ← □ □ □ □ →	 	 
	<i>Color Volume: RGB primaries, WP, max/min</i>	<i>Start and duration</i>	<i>Pixel coordinates Baseline = full screen</i>	<i>4 flavors of parameter sets</i>

Color Transform in Parametric Tone Mapping (Dolby)

Automatic, data-driven

Optional, under manual control



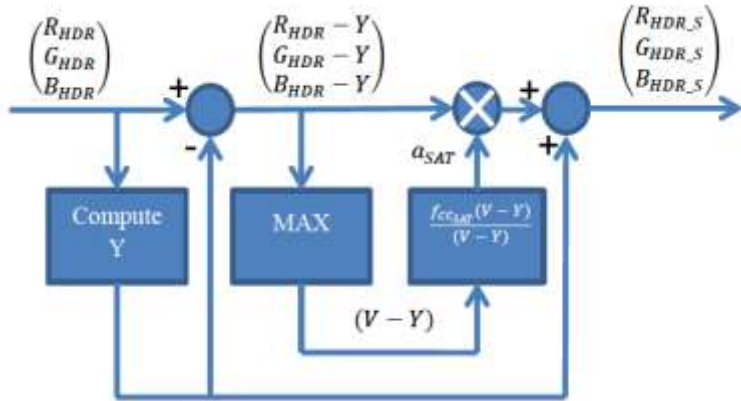
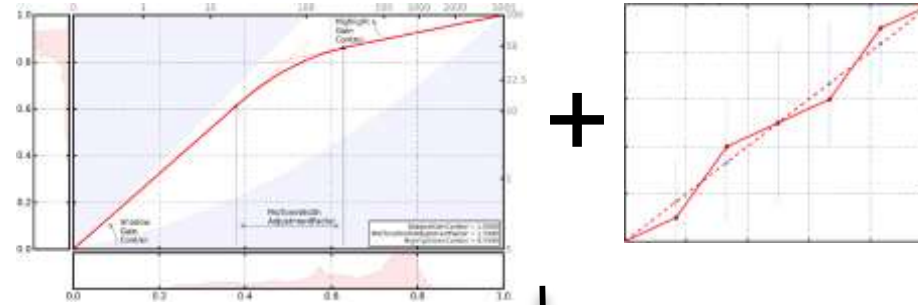
Data-driven tone mapping
min/avg/max clip RGB

Colorist's
Lift, Gamma, Gain

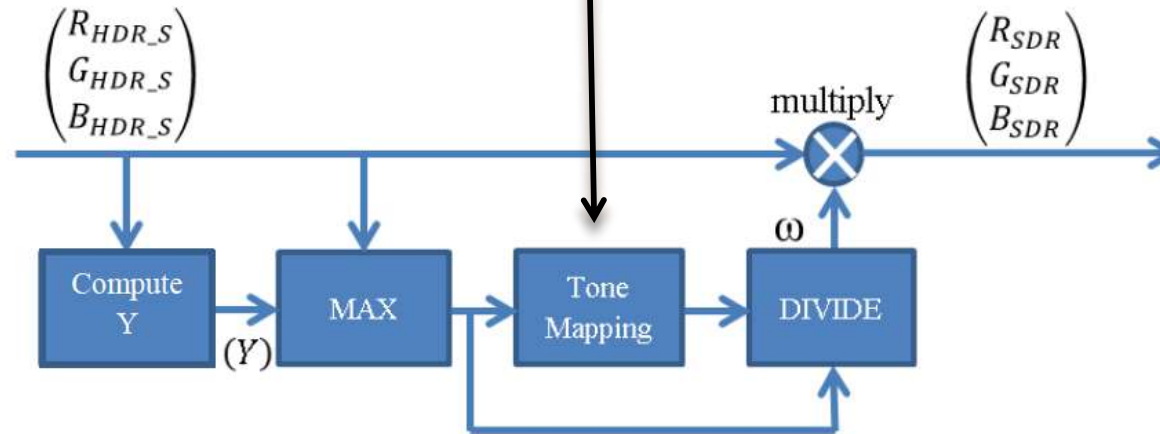
Boost
Saturation

Enhance
Details

Color Transform in Parameter-based Color Volume Reconstruction (Philips)

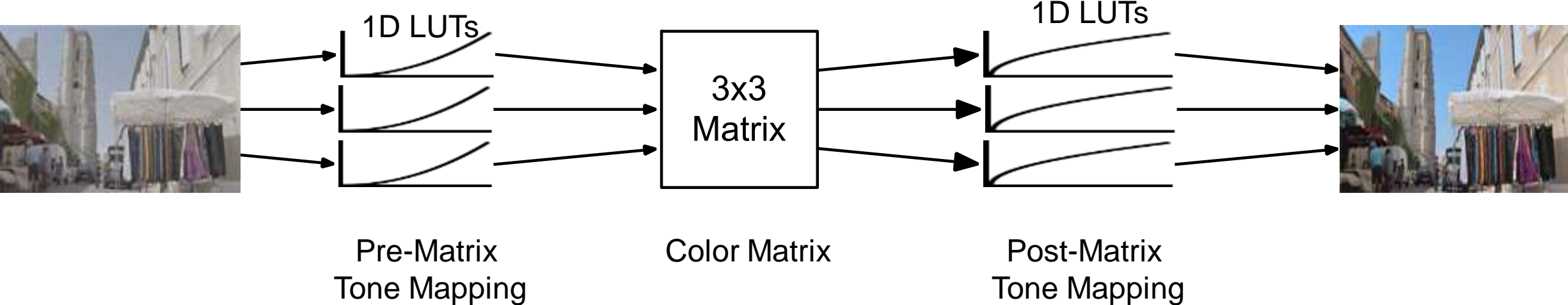


Saturation-driven Desaturation

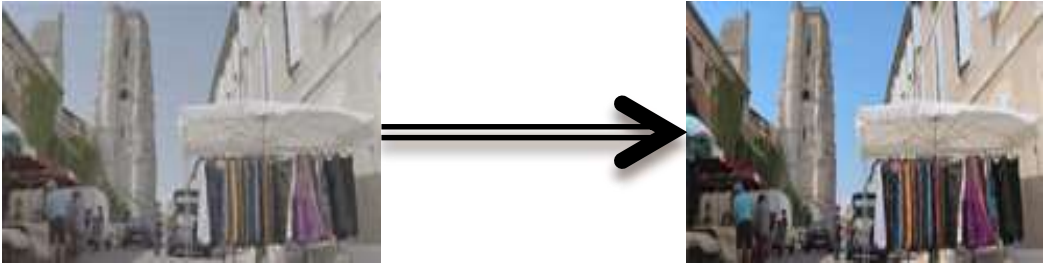


Luminance-based Tone Mapping

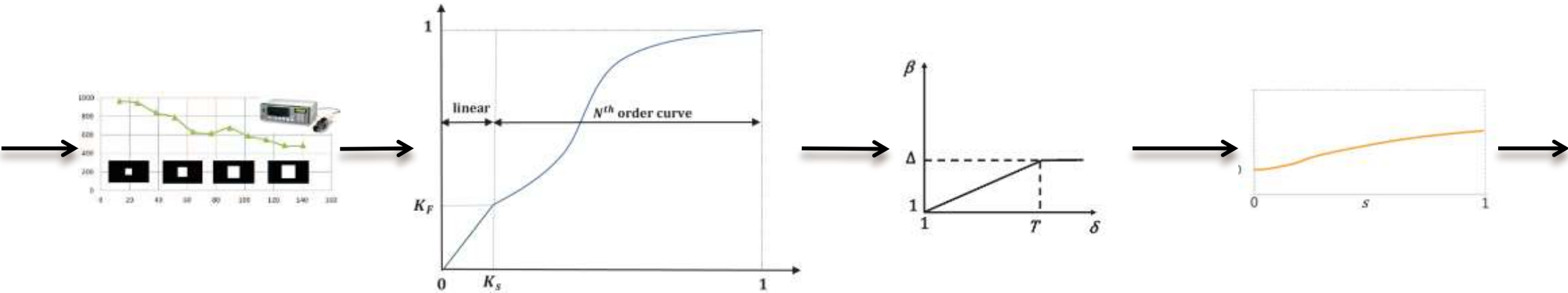
Color Transform in Reference-based Color Volume Remapping (Technicolor)



Not manually created.
Calculated through data fitting
between two grades of same clips



Color Transform in Scene-based Color Volume Mapping (Samsung)



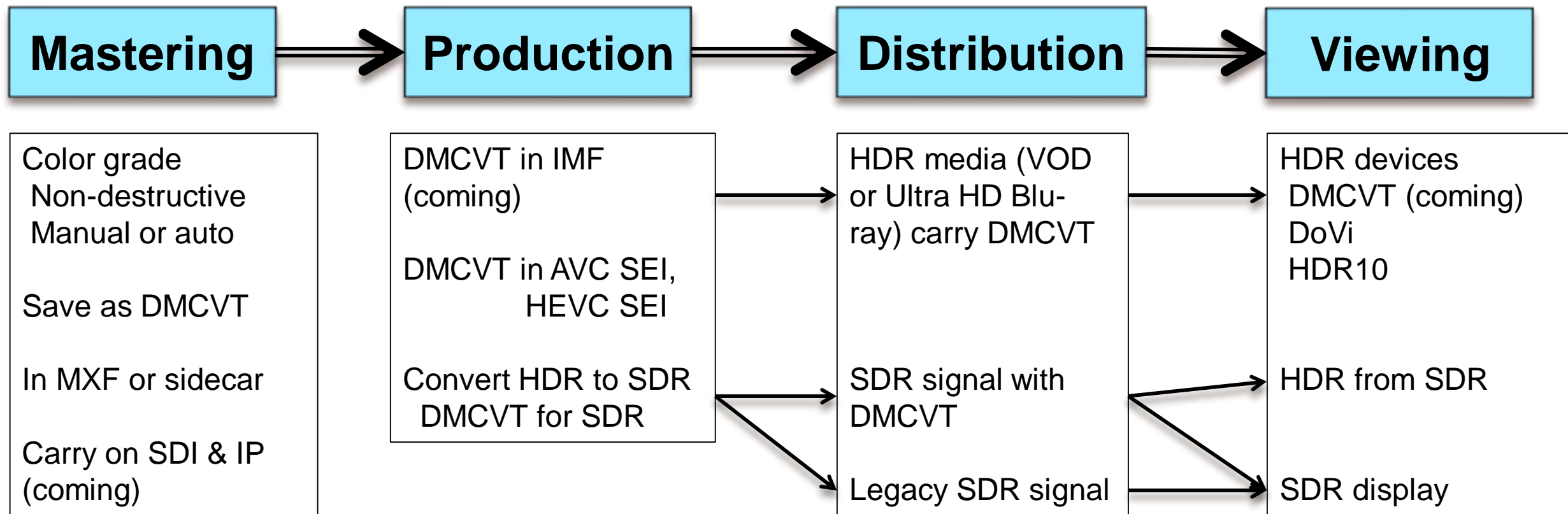
Normalized by
Actual Peak
Luminance

Tone Mapping

Auto-Gain
Tinted
Clips

Boost
Saturation

The DMCVT HDR Flow



- Dynamic Metadata for Color Volume Transforms (DMCVT)
 - Provides the best image quality from HDR media across a variety of displays
 - Is already available in end-to-end workflows
 - Embedded in MXF and HEVC video stream

