



\ ACADEMY COLOR ENCODING SYSTEM \

## ACES Update

HPA 2018

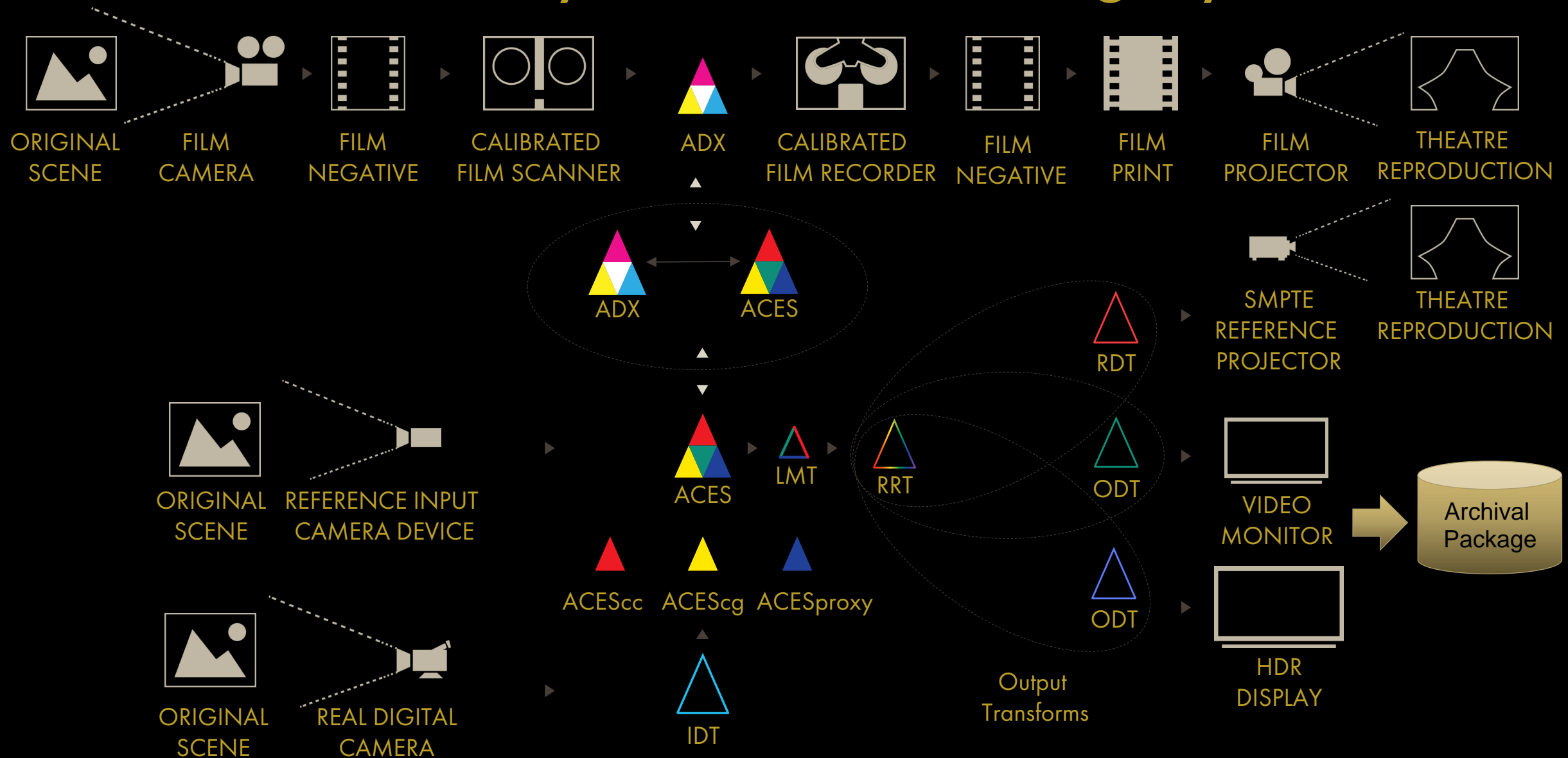
Presented by:

Annie Chang, ACES Project Chair

# ACES: Academy Color Encoding System

*ACES is a free, open, device-independent color management and image interchange system that enables creation of digital masters suitable for long-term archiving*

# ACES: Academy Color Encoding System



# ACES 1.0 Update

- ACES Adoption and ACESCentral.com
- *The Troop* ACES Digital Remastering and Archiving Case Study
- ACES IMF Standardization
- ACES Camera Assessment Test (Take 2)
- Implementation of Virtual Working Group concept
- Delivering SDR and HDR ODTs that Productions require
- Progression to ACESnext effort

# ACESNext

- Project Chair: Annie Chang
- Project Vice-Chairs: Rod Bogart, Joachim Zell
- Response to “ACES - Retrospectives and Enhancements”
- Listening Tour with ACES 1.0 users
- Meetings scheduled with various user groups
- Targeting completion of tour by end of March 2018
- ACESCentral.com and Virtual Working Groups



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\ ACESCentral.com  
@AcademyACES \



Hochschule **RheinMain**  
University of Applied Sciences  
Wiesbaden Rüsselsheim

# INTRODUCING IMF APPLICATION #5 “ACES”

Dr. Wolfgang Ruppel

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Chairman of DG “ACES in MXF” at SMPTE 35PM  
Consultant to the Academy for this project

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A PERFECT FIT !



Hochschule **RheinMain**  
University of Applied Sciences  
Wiesbaden Rüsselsheim



Picture Sources:  
<http://www.oscars.org/science-technology/sci-tech-projects/aces>  
<http://www.imfug.com>





## MOTIVATION

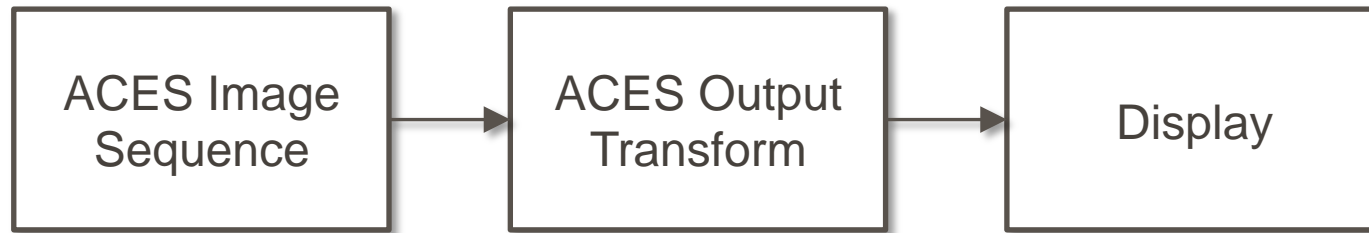
- Industry needs a data structure for **delivery and archiving Final ACES Master file sets**, along with audio sound fields and timed text
- IMF provides a framework for the file-based exchange and archiving of content as “compositions”
  - The Composition Playlist, as a key element, serves as playlist for all assets of a composition
  - IMF has inherent versioning support
  - The “App concept” allows for extensions to support additional image containers
- **Combining ACES image encoding and IMF appears to be an ideal solution for the long-term archiving use case**
- **Proponents of the related SMPTE project include the Academy of Motion Picture Arts and Sciences and all major Hollywood studios**

## OUTLINE OF IMF APP #5 ACES

- Prerequisite: MXF wrapping of ACES image sequences
  - Available as SMPTE ST 2065-5:2016
  - Specifies wrapping of ACES image sequences into MXF and basic descriptive metadata
- IMF Application #5 ACES to be published as SMPTE ST 2067-50
  - Specifies ST 2065-5 MXF wrapping (frame wrapping mode only) the for Image Track Files
  - References ST 2067-2 IMF Core Constraints
  - References ST 2067-3 IMF Composition Playlist
  - Any frame rate is supported
  - Defines metadata structures (see next slides..)
  - Defines a Pixel Color Scheme for OPL (Output Profile List) processing

## METADATA IN IMF APPLICATION #5 ACES

- ACES files are usually presented by means of an Output Transform



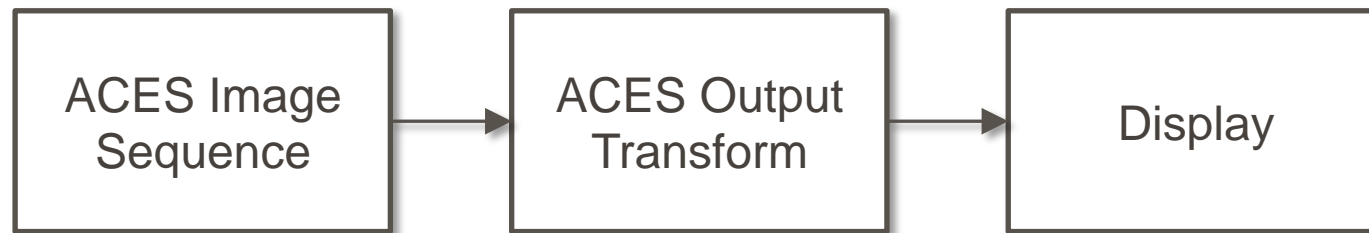
- **The challenge: How to document the Output Transform used in Mastering for archiving?**
- **The solution in IMF Application #5:**
  1. ACES Authoring metadata
  2. Mastering Display metadata
  3. “Target Frames” – Essence frames rendered in a display-referred color space



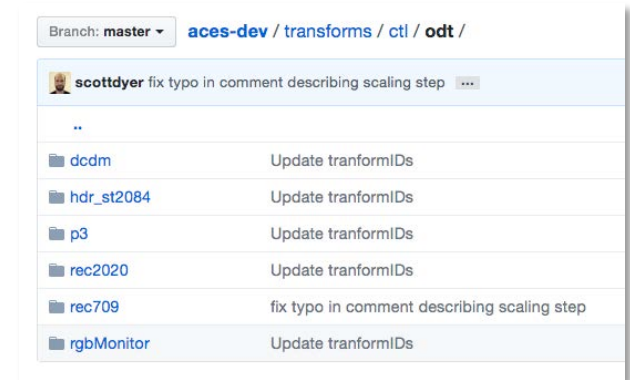
# METADATA IN APP #5

## ACES AUTHORIZING METADATA

- `AcesAuthoringInformation` item
- Documents one or (in the general case) more ACES Output Transform paths used in Mastering



- May carry the Transform ID of an AMPAS published ODT, e.g.  
`ODT.Academy.P3D60_ST2084_1000nits.a1.0.3`



<https://github.com/ampas/acses-dev/tree/master/transforms/ctl/odt>



## METADATA IN APP #5

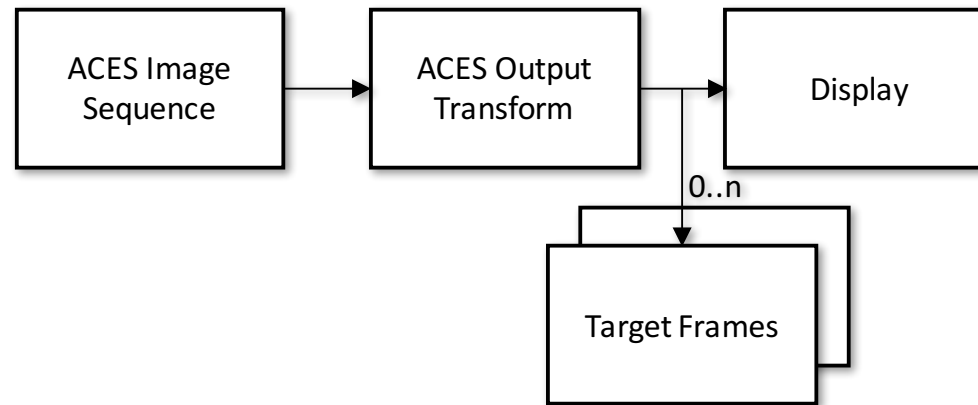
### MASTERING DISPLAY METADATA

- Mastering Display metadata, as specified in ST 2086:2014, can be added to an App 5 package
- Includes the following items
  - ACES Mastering Display Primaries
  - ACES Mastering Display White Point Chromaticity
  - ACES Mastering Display Maximum Luminance
  - ACES Mastering Display Minimum Luminance
- Note: The ST 2086 metadata should specify the “real-world” display. Its capabilities may or may not be below those supported by the Output Transform

## METADATA IN APP #5

### TARGET FRAMES

- Target Frames are provided to calibrate the IMF package “playback” display system and environment to match the original mastering display system and environment.



- Constrained PNG and TIFF supported as file formats
- Will be wrapped as Ancillary Resources
- If the Target Frames visually or mathematically match the rendered images obtained from a particular workflow, it gives a hint that the particular playback display system and environment recreates the artistic intent applied during the mastering process of the original ACES Image sequence.



# IMF APPLICATION #5 ACES

## NEXT STEPS – HOW YOU CAN GET INVOLVED!

- SMPTE ST 2067-50 has passed the final ST Audit and will be published soon.
- Follow-up activities
  - Plugfests
  - Open-source software
- Plugfests – how to get involved
  - Focus on compliance checking of Image track files
  - To be announced soon
  - We are looking forward to hearing from adopters and vendors!
- Open source software
  - ST 2065-5 wrapper / unwrapper
  - App#5 CPL preview



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# ACES Pipeline Assessment

## HPA 2018

Presented by Joachim Zell  
ACES Project Vice-chair



# Capture



CDL V1

# Dailies



CDL V2

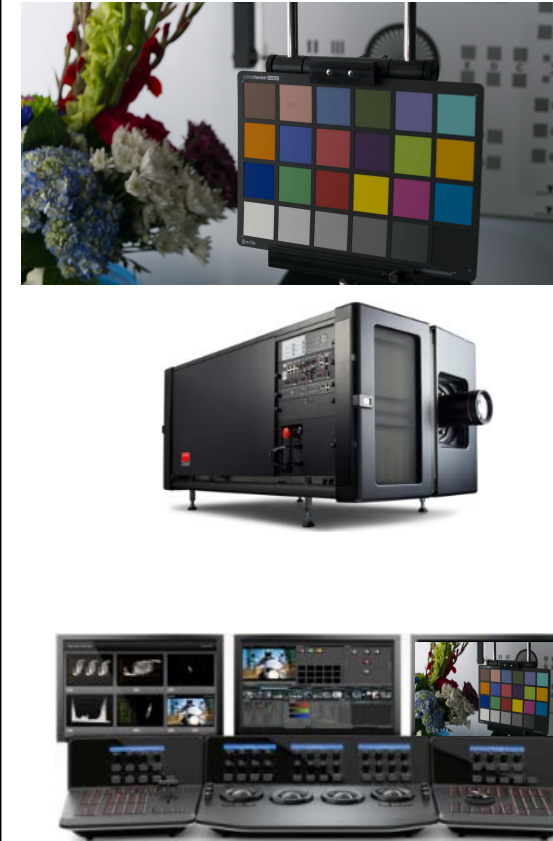
# Editing



# VFX



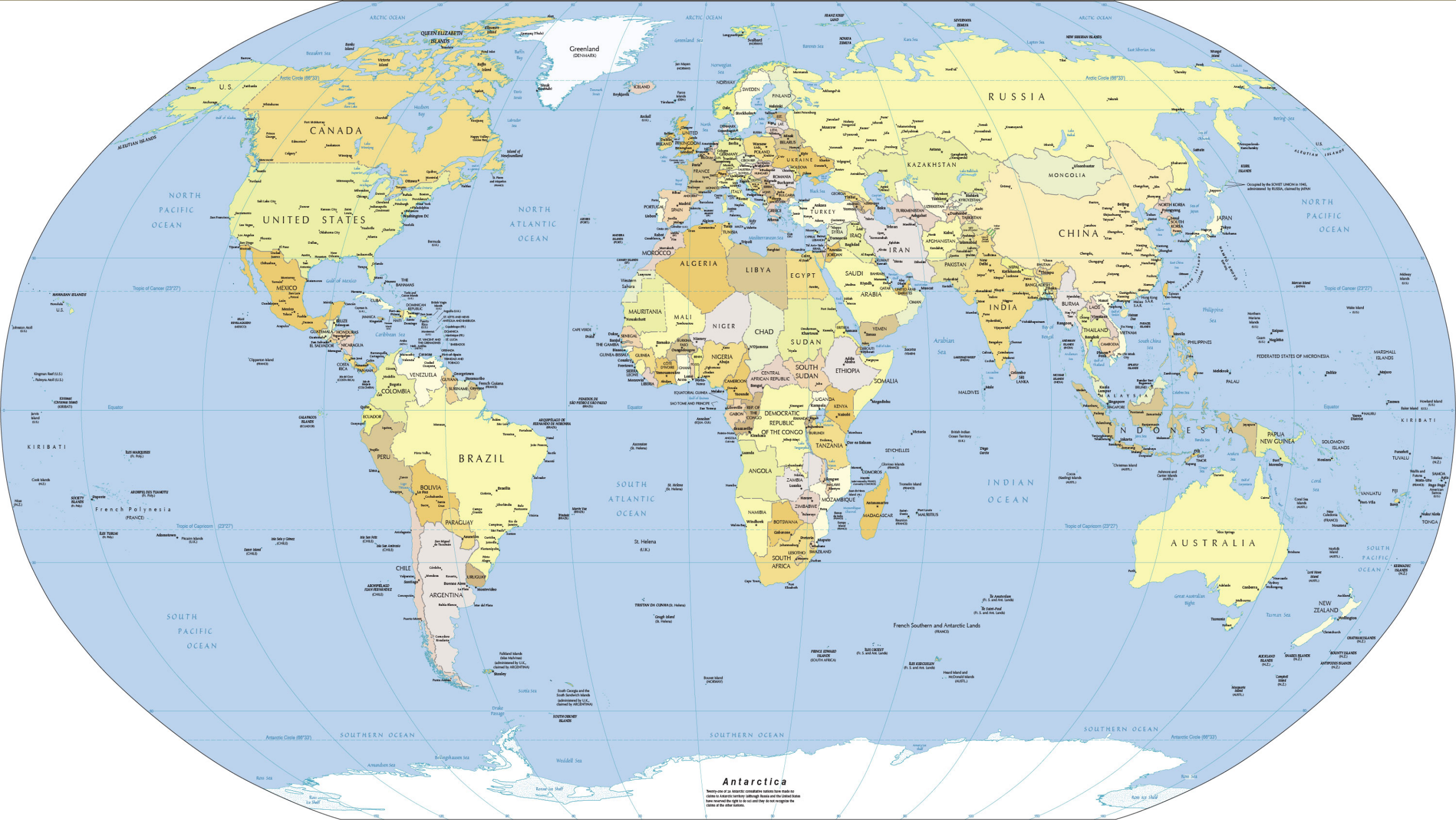
# Finishing



CDL V2 &  
DI Color Correction

January	Monday	Autumn
February	Tuesday	Winter
March	Wednesday	2018
April	Thursday	2019
May	Friday	2020
June	Saturday	
July	August	Sunday
September	October	Spring
November	December	Summer





### Antarctica

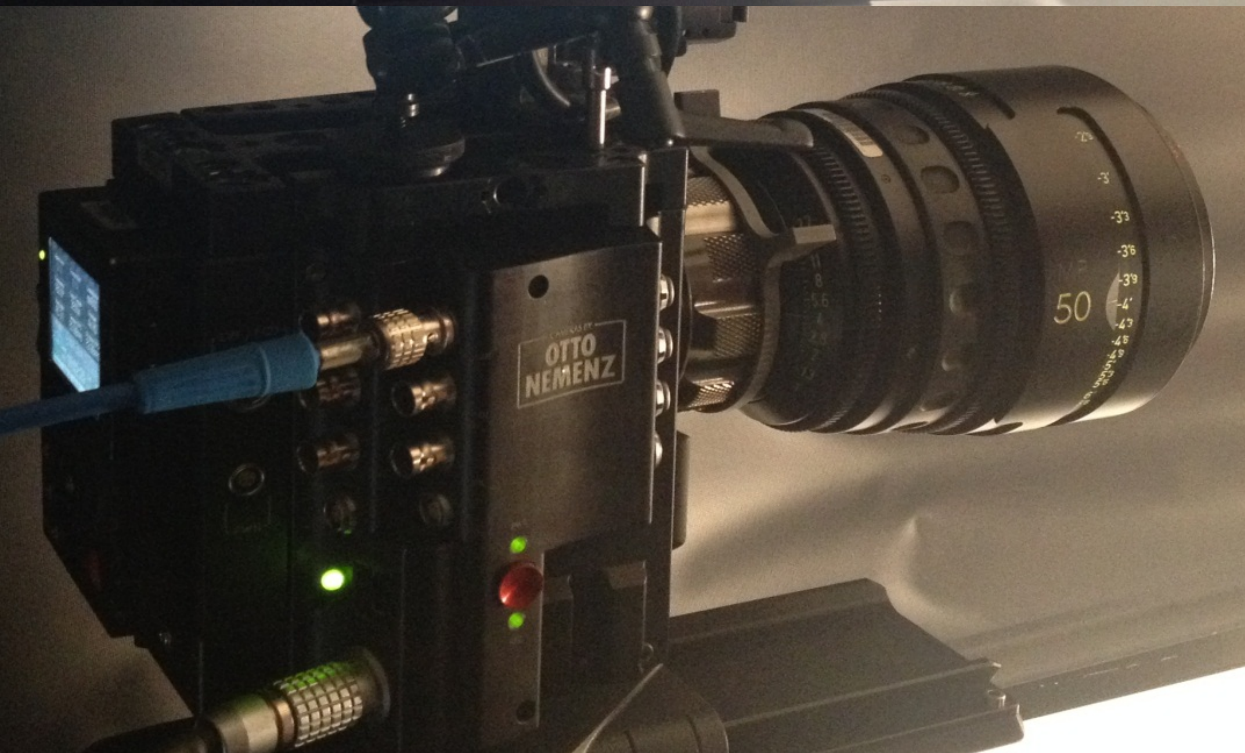
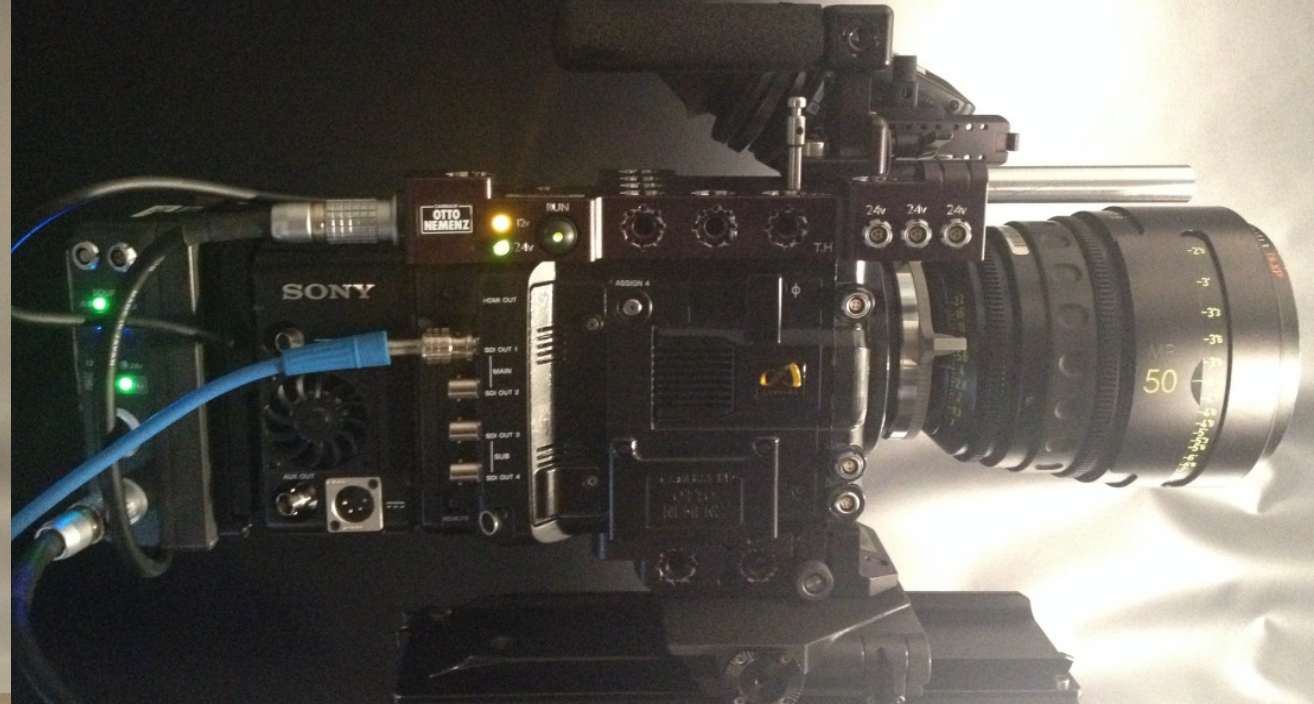
Twenty-one of the Antarctic continent's nations have made no claims to Antarctic territory (although Russia and the United States have reserved the right to do so) and they do not recognize the claims of the other nations.

2015

















A color calibration chart labeled "Camera4" is shown. It features a grid of 24 color patches arranged in 4 rows and 6 columns. The patches include a variety of primary, secondary, and tertiary colors, as well as a grayscale ramp from white to black. The chart is used for ensuring color accuracy in digital imaging.



2017

More Cameras  
Same Color Correctors

# CAMERAS BY **OTTO NEMENZ**





Same Settings  
Same Lens

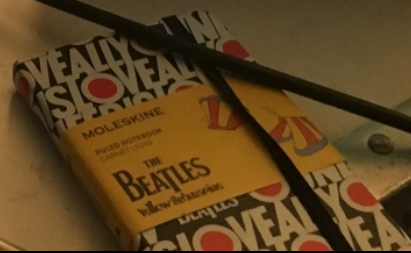




Same Setup for each Camera











# 2017 Camera and Color Corrector Test

## **CONCLUSION**

All color correctors deliver the same result, meaning IDTs, RRT and ODTs are implemented the same way

However, IDTs to match cameras could be improved



2018

More Cameras !!







B001C002\_171218\_R6XL.0000292.ari

ARRI RAW

ASA 800

K 3200

Shutter 180.0

PANAVISION

ColorBar/GrayScale Test Pattern

ChromaMatch Pro - SW - v15.5 A3

SN: 8017487617 A3

PROD.

ACES IDT TEST

ROLL

B1

SCENE

800 Iso 3200K  
T 2.8 2/3  
Shutter: 180

TAKE

Alexa  
XT

DIRECTOR

CAMERA

JZ/JG/DS/KC/PA/KWL

DATE

12-18-2017

FPS 24

DAY/NITE  
INT/EXT

# ToDo

- Implement ACES standard video monitoring outputs
- Define test setup to shoot 18% gray card as 800 ASA under 3200 Kelvin lighting
- Define color saturation
- Define allowed tolerances

# ACES is in products from these companies

ARRI

Assimilate

Autodesk

Canon

Color Trix

Codex

ColorFront

Deluxe

Digital Vision

Dolby Laboratories

FilmLight

Firefly Cinema

FotoKem

Light Illusion

Marquise Technologies

MTI Film

Panasonic

Pomfort

RED DIGITAL CINEMA

SGO

Snell Advanced Media

Shotgun Digital

Sony Electronics, Inc.

Technicolor

The Foundry



Look for this Logo

ACES components, documentation  
and educational materials  
are available here:

[ACESCentral.com](https://ACESCentral.com)

(for free)



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