\ ACADEMY COLOR ENCODING SYSTEM \

ACES Architecture
Technical Advisory Council Meeting

Wednesday, November 18, 2020

\ ACESCentral.com \

Agenda

Housekeeping

Proposed ACES Roadmap Discussion

Architecture Working Group Reports

- Gamut Mapping Architecture Working Group
- Output Transforms Architecture Working Group

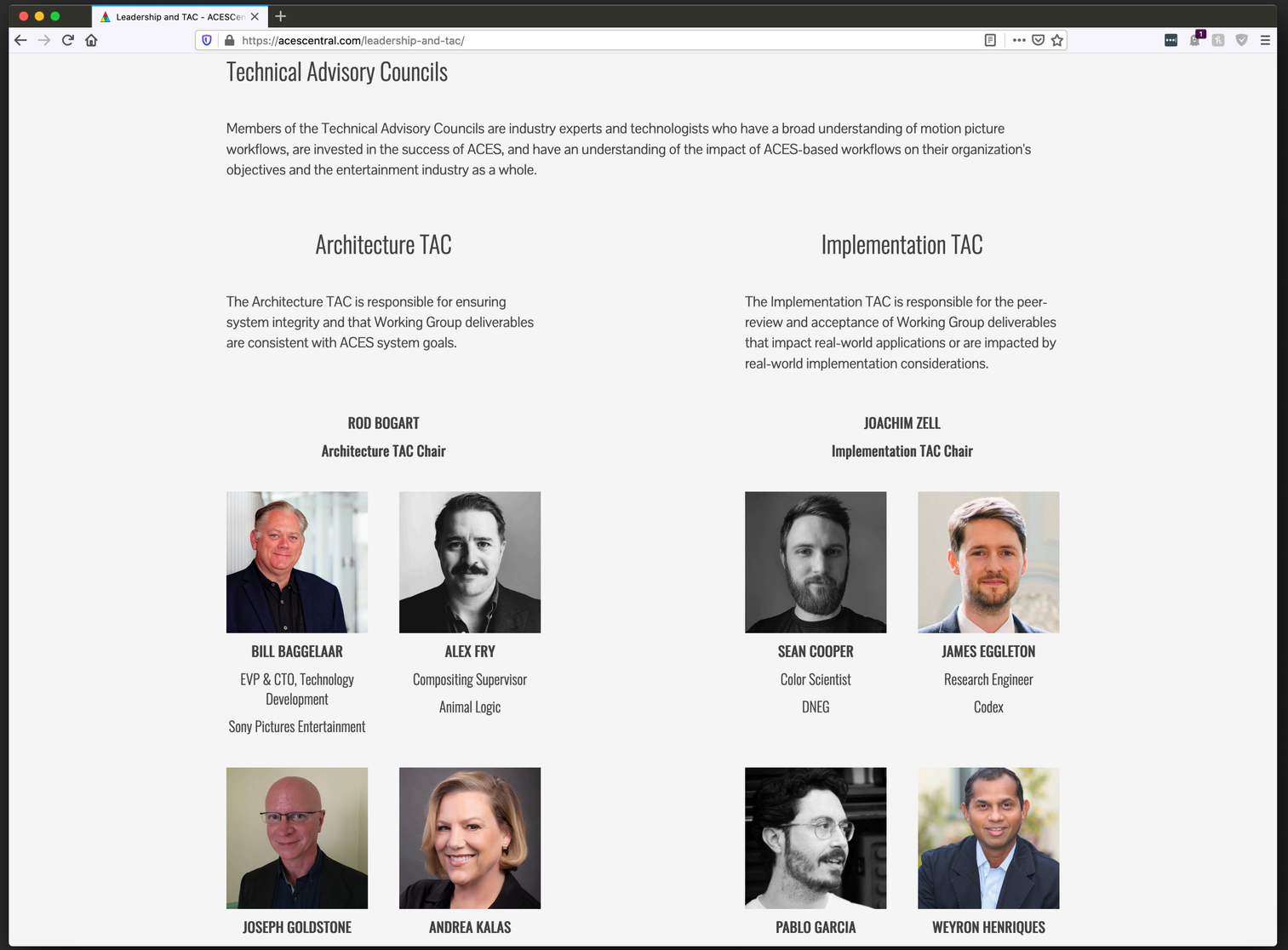
Expected outcomes

TAC provides feedback on the ACES Roadmap

TAC provides feedback to Working Groups on their progress and future plans

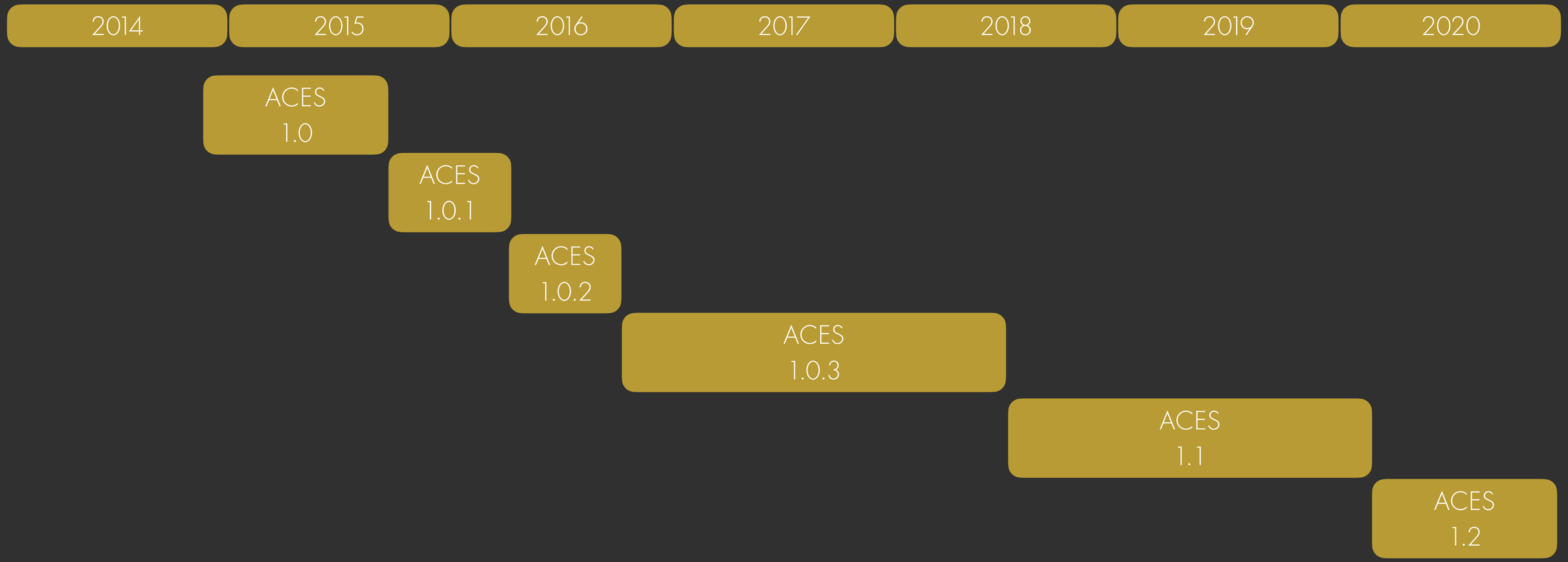
Housekeeping

ACESCentral.com TAC Page



Proposed ACES Roadmap Discussion

History of ACES Releases



History of ACES Releases

ACES 1.0 - 1.0.3

- Initial release, bug fixes, filling the gaps

ACES 1.1

- Better HDR

New Leadership, Listening Tour, Setting Priorities

ACES 1.2

- CLF and AMF

Listening Tour

Top requests from listening tour

- Simplified, invertible, parametric, well-documented output transforms
- Better gamut mapping (fix for color clipping)
- Color pipeline metadata (AMF)
- Robust non-CTL implementations (OCIO, etc.)
- Better documentation

Proposed Roadmap

ACES 1.3

- Major feature – Gamut Mapping Algorithm
- Spring 2021

ACES 2.0

- Major feature – New output transforms
- Q5 2021

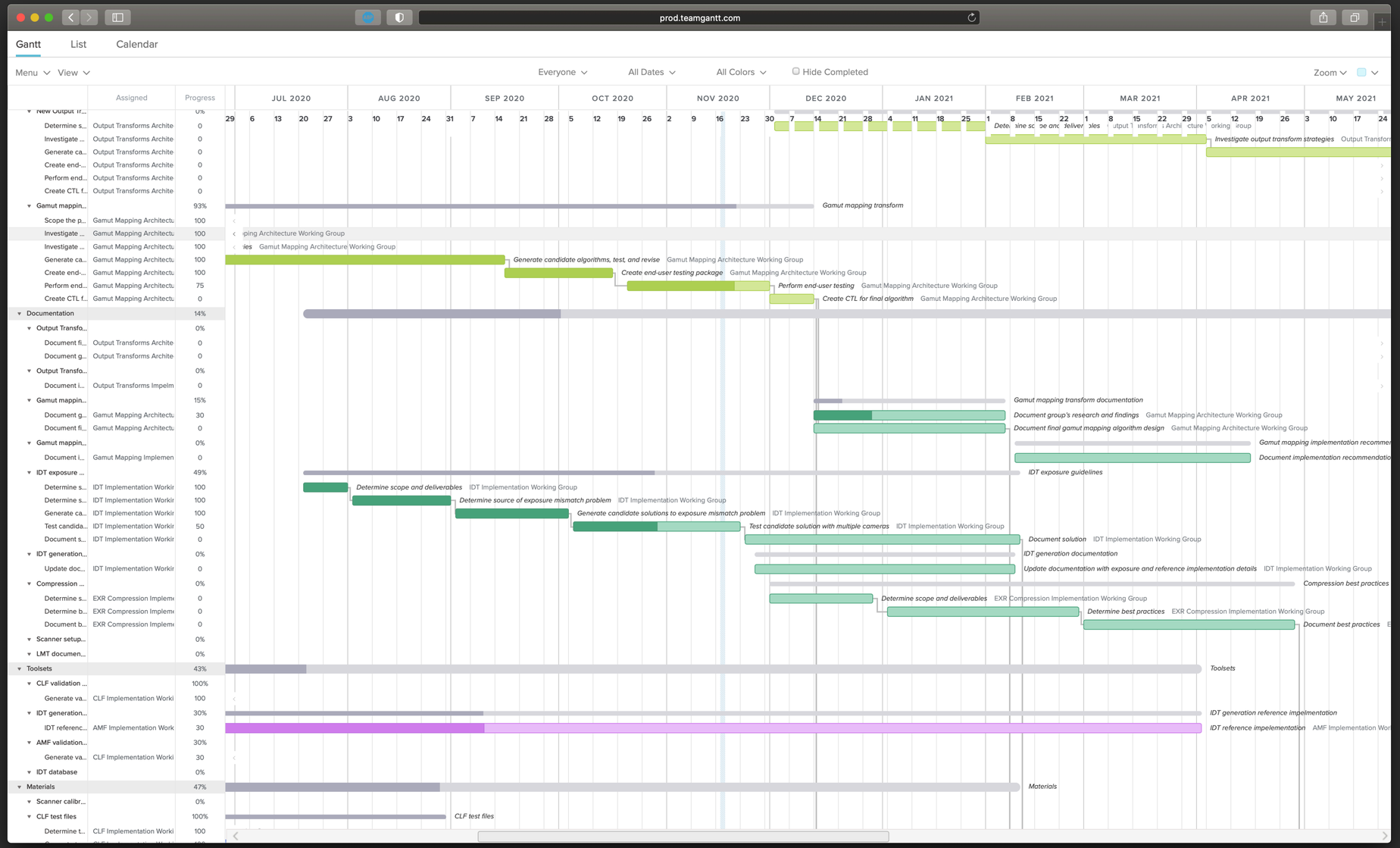
Getting there ...

Versioned ACES releases limited to transform additions and changes

Documentation removed from transforms repository and given its own home

Documentation, toolsets, test materials, etc. released as available

Getting there ...



Discussion & Questions

Gamut Mapping Architecture Working Group

User Testing Summary

Co-Chairs : Carol Payne (Netflix) & Matthias Scharfenberg (ILM)

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Background

Users of ACES are experiencing problems with clipping of colors and the resulting artifacts (loss of texture, intensification of color fringes). This clipping occurs at two stages in the pipeline.

- Conversion from camera raw RGB or from the manufacturer's encoding space into ACES AP0
- Conversion from ACES AP0 into the working color space ACES AP1

The current workaround is to utilize the "Blue Highlight LMT" - but this solution is incomplete and too specific to blue values. It also affects all pixels, as opposed to just offending out of gamut values.

From January to November

Research

We spent time researching and testing different methods of gamut mapping - from existing published methods that rely on CAMs to studio-specific work.

Algorithm Development

Once we settled on an algorithm model, we worked on deriving objective defaults, implementing in different DCCs and languages, and forming a repository for revision control.

User Testing

We collected imagery that demonstrated our problem set from major camera manufacturers, created test scenarios for compositors and colorists (6-10 each), and collected feedback to correlate via a google form.

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User Testing

Colorist

Footage Examples








Colorist - Key Takeaways

- All Colorist feedback so far is in Resolve (we're working on getting some Baselight feedback still)
- 6 total responses
- Half had access to HDR monitors

Colorist - Key Takeaways

Overwhelmingly, colorists stated the gamut mapping tool helped them complete their work.

Feedback highlights:

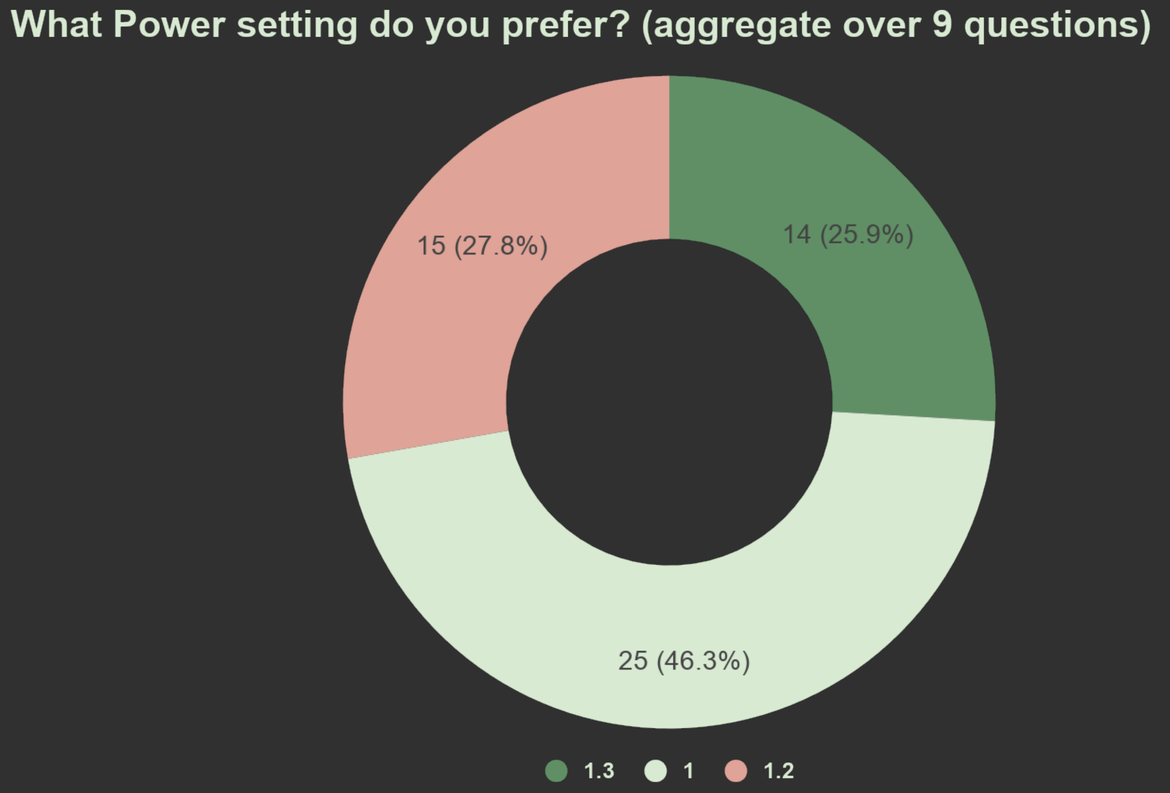
- "I found it easier to recover tones and keep color in the highlights when compared to the FixHighlights DCTL. Also not changing every pixel in the image is good for keeping original intent."
- "Without Gamut Mapper, clipped highlights had to be manually keyed and desaturated."
- "Particularly, in this scene I managed to make about 3 color variations in a very simple and natural way, without using a qualifier"

Colorist - Key Takeaways

The “Power” setting adjusts the shape of the compression function.
A lower value will “roll-off” earlier and “softer”.

Feedback highlights:

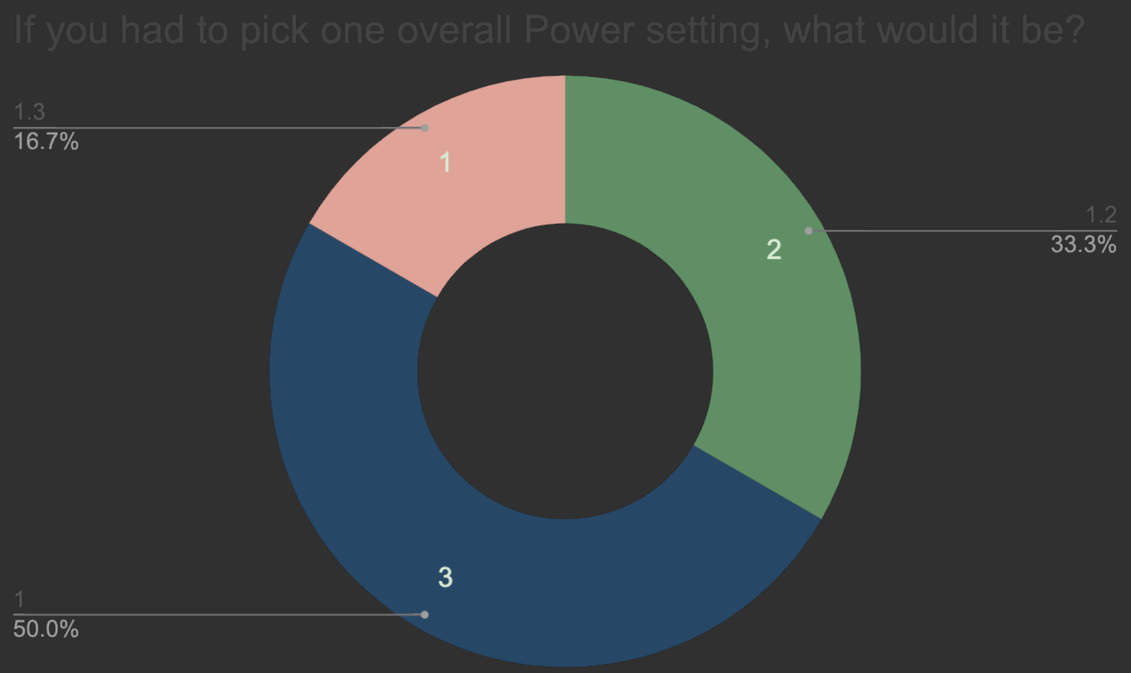
- In SDR, trends toward lower (less saturated)
- In HDR, trends toward higher
- In SDR, harder to see a difference so many chose our default value (1.2)



Colorist - Closing thoughts

100% responded that the Gamut Mapper would solve 80-90% of their issues out of the box

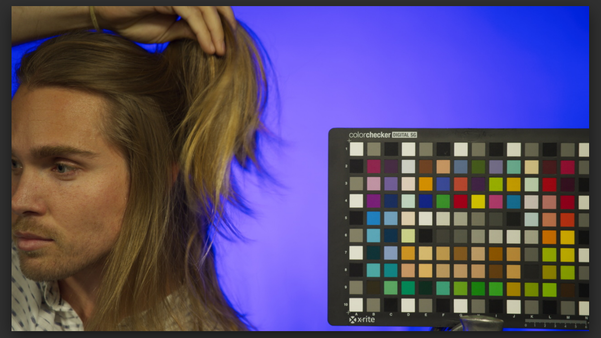
Most would prefer larger access to settings / control



User Testing

Compositor

Footage Examples



Compositor - Key Takeaways

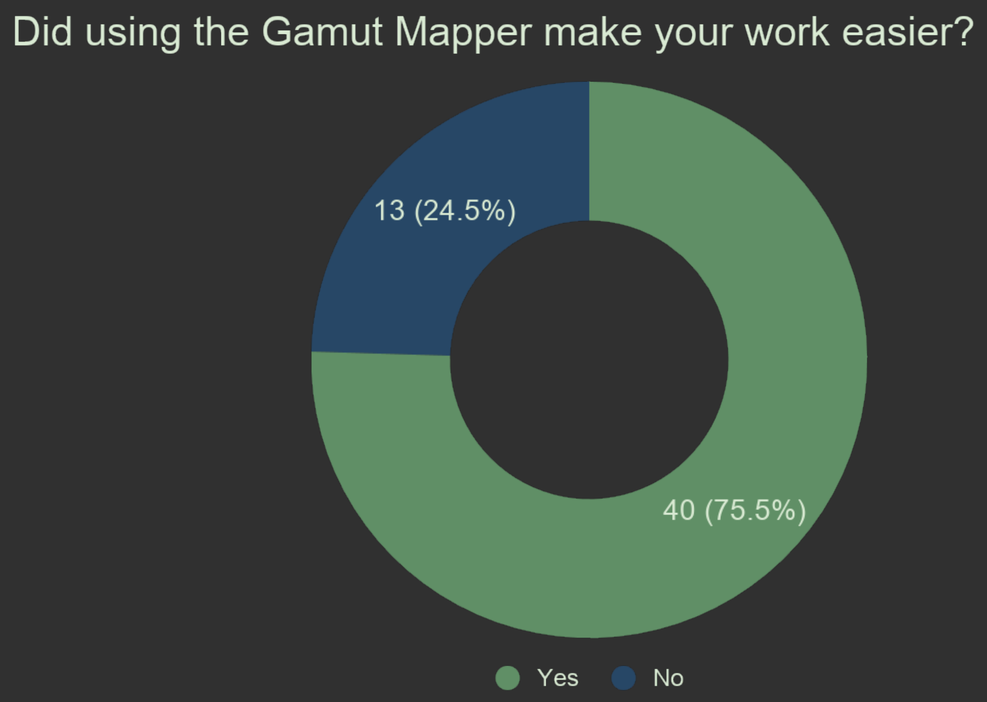
- All Compositor feedback is from Nuke
- 10 total responses
- None had access to true HDR monitors

Compositor - Key Takeaways

75% of compositors stated the gamut mapping tool helped them complete their work.

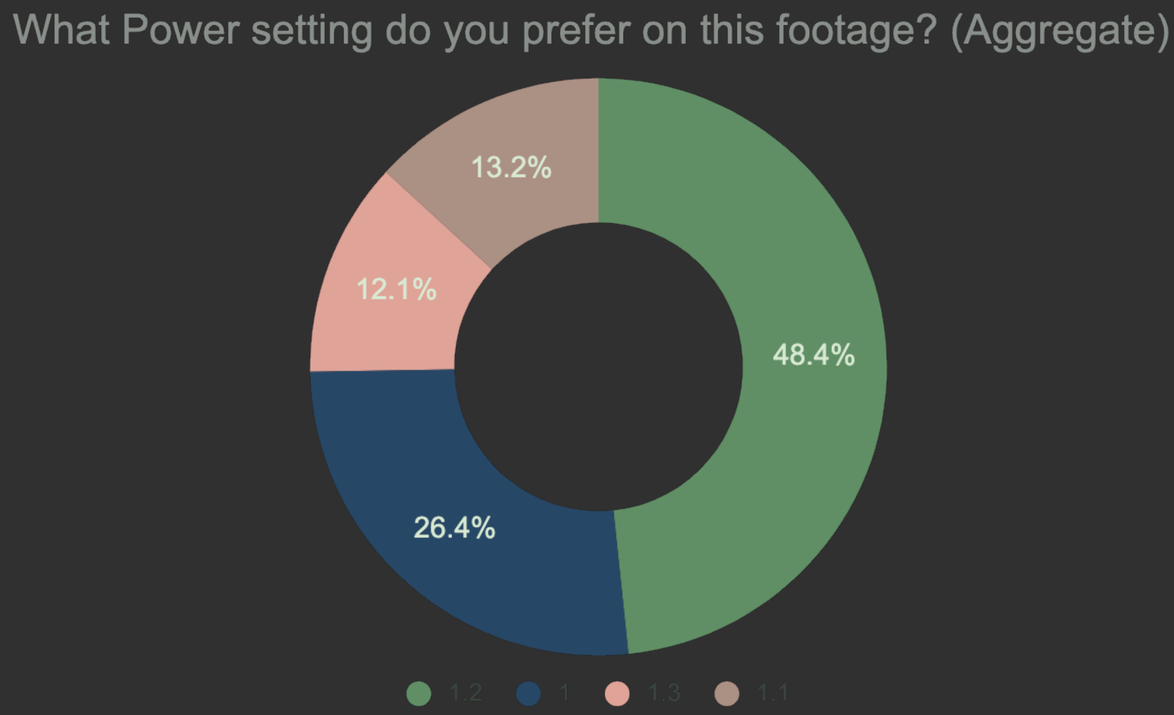
Feedback highlights:

- "Gamut compression makes more difficult to key motion-blurred and semi-transparent areas of the hair. Transition from solid FG to Blue Screen gets a strong purple cast after the gamut compression. With a simple Keylight extraction better results are obtained with straight ACEScg source."
- "The gamut mapper helped reducing the artifacts around the highlights in the image which helps when applying any type of filtering or convolving in this instance."
- "The gamut mapper helps again a lot with the noise floor for the de-noise operation (neat video 5.3)"
- "The Gamut Mapper node fixes negative values coming from blue light. Atmospheric element looks better and more natural when comped over non negative values. Part of the atmospheric effect includes blurring the footage through the atmospheric element alpha. This also work better with non negative values."



Compositor - Key Takeaways

Power setting seemed to matter less overall to compositors - less about the look, more about the function. The majority picked the default (1.2) as they didn't observe much of a difference between the options.



Closing Thoughts - Negative

- “It needs more flexibility. The 'power' value isn't sufficient to adjust the compression. It needs to be adjustable to work out best settings for different footage.”
- “I wish the range of Power setting is much wider than what it is now. The difference between 1.0~1.3 is very minimal and wish it offers a little more distinctive outcomes.”
- “Again I wonder if there are any thoughts to tweak the mapping of blue/purple hues a little more. Visually I find AWG does a better handling of this. For red hues the mapper does a fantastic job.”
- “As mentioned, it behaved very well in most situations. The only issue I've found was the artifact in the highlights in two examples.”

Closing Thoughts - Positive

- “I found the tool was most effective when carrying out despill operations and colour grading. After doing this test I would say I whole-heartedly support it!”
- “Gamut Mapper fixes most artifacting and clipping without changing overall color and contrast. Other dctls desaturate most hues, shift blue to cyan and do not solve clipped reds and yellows.”
- “I think this would bring us forward, all the shows now use more than one camera and we need to be able to solve for that in colour.”
- “In these specific examples, except for keying, all the other processes benefit from have the out of gamut color brought into a better workable range.”
- “I spent a bit of time just trying to break it but I'm finding that it's giving a really great base right away. It's eliminating those terrible hard edges and giving a really nice rolloff right away which actually gets me very excited about this project.”

Conclusions / Next Steps

- 100% (across colorists and compositors) stated that having access to this gamut mapping tool would make them more likely to work in ACES in the future!
- We received no “showstopper” feedback and feel confident in moving towards an architecture deliverable
- We have a few things to follow up on - effects on ability to despill keys (shows that ability to bypass is important), whether or not to handle HDR settings differently
- A few pieces of feedback (availability and modification of settings, overall workflow questions) that we will move to when the Implementation group starts up.

Discussion & Questions

Output Transforms Architecture Working Group

Co-Chairs : Alex Fry (ILM) & Kevin Wheatley (Framestore)

Responsibilities

- Alex Fry & Kevin Wheatley - Working Group Co-Chairs
- Scott Dyer - ACES Staff Liaison
- Nick Shaw - ACES Consultant
- Steve Tobenkin - ACES Adoption/Comms Lead

Goals

- Create a stable, robust, capable, and visually pleasing rendering transform to be used for ACES
- Correct for known artifacts when using the current model
- Resolve design limitations and inconsistencies of current model
- Enable unforeseen use cases with easy to use parameterized output variables
- Simplify
- Maintain backwards compatibility
- Document the how and the why of all design decisions

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Deliverables

- Documentation
  - Research new use cases
  - Design decisions
  - Meeting notes/process documentation
- Provide a reference implementation and test cases for validation

Potential Threats to success

- Finding the right balance between “Colour Science” and “What Works”
- Difficulty in having a shared viewing environment under current restrictions
- Expanding the use case too much could make the system too vague
- Difficult separation of the technical vs aesthetic aspects of the problem
- Refactor existing vs independent new beginning?
- Existing vendor solutions
- Potentially long duration of the project

Roadmap

Phase 1 (clarify and define scope - nominally 6 months?)

- Open requirements gathering - seek input from all comers
    - What is wrong
    - What is right
    - What new functionality could be added
    - What should we keep
    - Review existing published commentaries as well as community feedback
- Deliverable: Summary statements, refined scope, rules of engagement

Call for proposals ?

Separate group to establish testing criterion?

Roadmap

Phase 2 (Algorithm Development - 6-12 months)

- Rolling wave planning based on the Phase 1 outcomes with multiple iterations
    - Evaluation methods
    - Testing metrics
- Deliverables: CTL and/or similar reference (e.g. Python), Test cases (images, colour patches, measurement techniques)

Discussion & Questions