D3.1 Internal Demonstration of Initial Pipeline Tools

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Abstract	This document is a placeholder for the internal demonstration of the initial pipeline tools, as presented at the forthcoming technical meeting in Valencia on 11/12th July. It gives an overview of the tools presented.
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Summary and Background

Task 1 of WP3 is concerned with colour grading and colour management tools specifically developed or modified to deal with HDR finishing. The work programme groups them into two categories – grading tools and visualisation tools. A better description is perhaps creative and workflow tools.

This distinction is relevant because of the need for multiple deliverables, in both HDR and SDR. It is not practical or productive to use multiple display pipelines in parallel to achieve this. What is required is not only a flexible way of visualising different viewing environments but a flexible way to convert from any viewing environment to any other when generating deliverables.

At the same time, it is important to have tools that allow plausible creative modifications to the image whether in SDR or HDR. This is particularly relevant because the classic, telecine-style grading operators of lift, gamma, gain are display-referred and implicitly designed to operate on gamma-encoded video. With alternative encoding schemes like PQ and specially HLG, these conditions aren't met, leading to unexpected and suboptimal results.

Similarly, specific looks, like any form of film emulation, typically encoded in 3D LUTs, have a limited dynamic range that make them unsuitable for HDR.

The tools FilmLight developed have been demonstrated and evaluated over the last 12 months with a wide range of materials and viewing environments. During this process, various refinements and modifications have been made to improve their robustness, ease of use and accuracy. At the same time, this road test has revealed a number of issues that require further investigation, and work on developing solutions is ongoing.

One of them is the strong interaction between artistic composition and dynamic range in the context of visual storytelling. The Director of Photography would often not make the same lighting and framing choices when shooting for SDR or HDR. This situation clearly puts a limit on the possibility of a fully automated conversion between the two formats.

Another one is the interaction between sharpness and high dynamic range. Boosting the highlight contrast in HDR can lead to an unnatural, aliased look that doesn't maintain the natural high frequency roll-off we would expect from an image captured with a real camera.

A further issue is the behaviour of highly saturated colours. Because of the 3-colour additive properties of the display devices that don't intrinsically limit the luminance of highly saturated colours, they can turn very quickly into fluorescent, self-illuminating colours. While this has been a long standing feature of television with the electric green of grass in a football stadium, the effect is much more pronounced in HDR.

The demonstration will touch on all these issues, showing both the way traditional tools fail when working in HDR, and how the new tools overcome these limitations.

Together, these tools will demonstrate that the aims set for WP3T1 have been achieved, namely:

- Enhancing their viewing tools so that a DoP can light a scene using new HDR displays on-set.
- Providing looks so that the user can see the best representation on a display at any point of the post-production process that will best match the capabilities of the delivery format.
- New grading tools based on colour appearance and human vision, that can exploit the HDR medium to the full.
- Extend the tools beyond catering for conventional forms of visual storytelling like film and TV, as well as immersive and mobile displays.