D4.1 Report on the initial eStudio HDR graphics engine

Grant Agreement nr	761544
Project acronym	HDR4EU
Project start date (duration)	July 1st 2017 (36 months)
Document due:	31/3/2018
Actual delivery date	
Leader	Brainstorm Multimedia
Reply to	jmontesa@brainstorm3d.com
Document status	draft

Project funded by H2020 from the European Commission

Project ref. no.	761544
Project acronym	HDR4EU
Project full title	HDR4EU
Document name	HDR4EU D4.1 Report on the initial eStudio HDR graphics engine
Security (distribution level)	CO (public version for the project website)
Contractual date of delivery	31/3/2018
Actual date of delivery	
Deliverable name	D4.1 Report on the initial eStudio HDR graphics engine
Type	R
Status & version	draft
Number of pages	
WP / Task responsible	WP4 – Real time Generation / Brainstorm Multimedia
Other contributors	-
Author(s)	Javier Montesa, Moises Ferrer
EC Project Officer	Mr. Miguel Montarelo-Navajo, Miguel.MONTARELO-NAVAJO@ec.europa.eu
Abstract	Brainstorm tasks in WP4 have been organised in order to obtain as soon as possible the required modules in the graphic engine required to test the whole real time HDR chain as it will be populated during the project. This document reports the works done in those tasks related with this objective, the initial eStudio HDR graphics engine implementation.
Keywords	HDR, real time, graphics engine, video in, video out
Sent to peer reviewer	28/3/18
Peer review completed	05/04/18
Circulated to partners	Smoke & Mirrors
Read by partners	Ari Ghosh
Mgt. Board approval	

Table of Contents

1. Introduction

This document reports the works done and the results obtained on the initial eStudio HDR graphics engine release. This works involve several tasks and follow several objectives in WP4. In fact the main objective in this work package is precisely to update the eStudio so it is HDR compatible in all its stages. And in order to achieve it, this objective has been split in four:

1. To upgrade the graphic engine video input and output subsystems so they are capable to **manage HDR video signals**.
2. To upgrade the graphic engine with **tone mapping** capabilities to control the dynamic range at both sides, input and output.
3. To upgrade the graphic engine with **HDR rendering** and **rastering** modules so they manage high dynamic range frame buffers, rastering algorithms, textures and graphic effects.
4. To **test** and **validate** these developments via demonstrations.

These changes will apply on most of the graphic engine subsystems, and will also add some other. After all these implementations will be ready, the graphics engine will modify its architecture to include them.
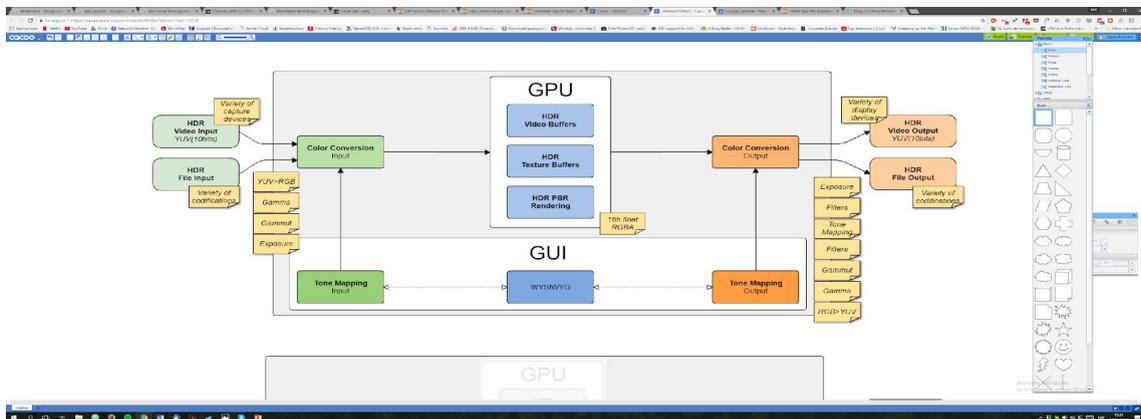

Figure 1. Graphics engine blocks diagram.

This block diagram shows the implementations taking place in WP4. Green and orange blocks are related to the video input and output subsystems, while blue ones are related to the rendering and rastering engines.

The Graphic User Interface required to manage the whole chain behaviour is connected both to the input and output sides, and uses the graphic engine to display results in real time as the user manipulates the provided parameters. Therefore it contains the three types of blocks.

These works have been organized in five tasks:

- WP4T1 Video Playout

Focused on the *HDR Video Output* and *HDR File Output* blocks, once finished, this task will provide one of the required tools to test the rest of modules in the system.
- WP4T2 Video Capture

Following the *WP4T1* developments, this tasks focuses on the *HDR Video Input* and the *HDR File Input* blocks. Once finished, it will provide one of the required tools to test the rest of modules in the system.

- WP4T3 Testing & Validation of Colour Conversion Modules

This task focuses on the *Input Colour Conversion* and the *Output Colour Conversion* modules, providing conversion methods, algorithms and shaders to manipulate HDR frames in real time.

- WP4T4 Demonstration & Validation Colour Control User Interface

This task focuses in the overall Graphical User Interface required to control all the HDR parameters present in the system. More concretely it deals with the *Input Tone Mapping* module and the *Output Tone Mapping* module interfaces and also uses the render pipeline in order to provide real time output through the *WYSIWYG* module.

- WP4T5 Pilot version of Graphics Engine with Validation Testing

Finally this tasks focuses on the render engine in order to make it use HDR buffers throughout all the process of rendering and rastering.