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**Intermediate Report on 3D Standardisation and International
3DTV Activities and Project Contributions to Standardisation
Bodies and Industry Consortia**

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TABLE OF CONTENTS

1	INTRODUCTION.....	5
2	UPDATE ON STANDARDIZATION AND INDUSTRY CONSORTIA ACTIVITIES.....	5
2.1	3D@HOME.....	5
2.2	ADVANCED TELEVISION SYSTEMS COMMITTEE (ATSC).....	6
2.3	THE DIGITAL VIDEO BROADCASTING PROJECT (DVB).....	6
2.4	ITU-R.....	6
2.5	INTERNET ENGINEERING TASK FORCE (IETF).....	6
2.6	MOVING PICTURE EXPERTS GROUP (MPEG).....	7
2.7	THE SOCIETY OF CABLE TELECOMMUNICATION ENGINEERS (SCTE).....	7
2.8	THE SOCIETY FOR MOTION PICTURE AND TELEVISION ENGINEERS (SMPTE).....	7
2.9	VIDEO QUALITY EXPERTS GROUP (VQEG).....	7
2.10	WIRELESS HOME DIGITAL INTERFACE (WHDI).....	7
3	MUSCADE CONTRIBUTIONS TO STANDARDISATION BODIES AND INDUSTRY CONSORTIA.....	7
3.1	INTERNATIONAL COMMITTEE FOR DISPLAY METROLOGY (ICDM).....	7
3.2	MOVING PICTURE EXPERTS GROUP (MPEG).....	8
3.3	THE SOCIETY FOR MOTION PICTURE AND TELEVISION ENGINEERS (SMPTE).....	8
4	SUMMARY AND CONCLUSIONS	8

1 INTRODUCTION

Compared to June 2010 where the first Muscade deliverable on standardization D5.1.1 was written a substantial set of new activities in standardization could be observed. Some organizations started with 3D related activities while others which were already engaged one year ago have intensified and broadened their activities.

Section 2 provides an overview of recent activities in standardization as well as in industry consortia. The main focus of most bodies is still related to stereoscopic 3D. Partly one disparity/depth map is already covered (IETF) obviously mainly motivated by the recent HDMI 1.4 standard. A much wider scope is covered within the new SMPTE Dense Disparity Map AhG. The group is chaired by a Muscade partner. Muscade contribution activities to standardization up to now are described in section 3.

2 UPDATE ON STANDARDIZATION AND INDUSTRY CONSORTIA ACTIVITIES

While the first Standards deliverable D5.1.1 of Muscade provided an in depth overview of the most important bodies, their general procedures and their activities in the field of 3D this section now focuses on new activities or new results during the last twelve months.

2.1 3D@HOME

A new Steering Team ST5 has been initiated by 3D@Home to specifically cover human factors aspects. The team aims at setting up typical testing environments and collecting appropriate test material. Tests are planned to be carried out in collaboration with partner organizations.

ST1 (Content Creation) contributes to the ASC (American Society of Cinematographers) effort to create a 3D StEM (Standard Evaluation Material).

ST2 (Content Storage, Transmission & Distribution) has finalized the first version of the definition of a generic 3D eco-system which is now available online¹.

ST3 (3D Promotion, Education & Communication) started a collaboration with the American Optometric Association.

ST4 (3D Displays & Metrology) is assisting the CEA with testing of 3D glasses, constantly maintains a 3D products database and has set up an auto stereo focus group.

ST5 (Human Factors) is a new established Steering Team. The team plans to conduct tests focusing on typical environments found in the home. Accordingly sub-groups to collect appropriate material and to set-up a dedicated test matrix have been formed.

¹ 3D@Home: 3D eco-system - <http://www.3dathome.org/images/3d-ecosystem.html>

2.2 ADVANCED TELEVISION SYSTEMS COMMITTEE (ATSC)

ATSC had initiated a 3D-TV Team (PT-1) in May 2010. First goal was to analyze benefits of a standard for terrestrial broadcast delivery of 3D-TV. Based on the analysis two AHGs have been formed end of December 2010 addressing specific areas of 3D. In March 2011 a formal request for information was issued² to complete an overview in technologies and formats for 3D broadcast which was described in an interim report³ released in February 2011.

2.3 THE DIGITAL VIDEO BROADCASTING PROJECT (DVB)

The Technical Module 3DTV (TM-3DTV) and Commercial Module 3DTV (CM-3DTV) identified two phases for the 3DTV deployment:

- Phase 1 for deploying 3DTV on existing HD networks without having to change the hardware
- Phase 2 for deploying a full resolution 3DTV concept, improving the quality of experience

The DVB-3DTV specification for phase I has been approved by the DVB Steering Board in February 2011⁴. This document specifies the delivery of frame compatible plano-stereoscopic 3DTV services over existing HDTV broadcast infrastructure for 3DTV capable displays already in the market. Plano-stereoscopic imaging systems deliver two images (left and right) that are arranged to be seen simultaneously, or near simultaneously, by the left and right eyes. Frame compatible formats, signalling information for frame compatible 3DTV services, handling of subtitles and other onscreen graphics are detailed in the document.

2.4 ITU-R

Study Group 6 working on topics related to digital three-dimensional TV broadcasting since 2008 has released report ITU-R BT.2160-1⁵ in January 2010. It describes “Features of three-dimensional television video systems for broadcasting”.

2.5 INTERNET ENGINEERING TASK FORCE (IETF)

The Working Group Multiparty Multimedia Session control (mmusic) is working on an SDP attribute “3dFormat” covering Stereoscopic 3D in simulcast, frame packing and 2D+auxiliary formats. The auxiliary data can contain depth maps. Current status of the work is an Internet-Draft (working document)⁶; it describes the offer/answer mechanism with and without 3D support.

² ATSC request for information on 3D Technology: www.atsc.org/PT1/PT1-028r0-Request-For-Information.pdf

³ ATSC PT1 Interim Report: www.atsc.org/PT1/PT1-1-Interim-Report.pdf

⁴ Digital Video Broadcasting (DVB); Frame Compatible Plano-Stereoscopic 3DTV (DVB-3DTV) http://www.dvb.org/technology/standards/a154_DVB-3DTV_Spec.pdf

⁵ ITU-R SG6 report on 3D TV: http://www.itu.int/dms_pub/itu-r/opb/rep/R-REP-BT.2160-1-2009-PDF-E.pdf

⁶ IETF 3dFormat Internet Draft as of May 2011: tools.ietf.org/pdf/draft-greevenbosch-mmusic-signal-3d-format-01.pdf

2.6 MOVING PICTURE EXPERTS GROUP (MPEG)

3DVC (MPEG 3D Video Coding): a Call for Proposal has been issued in March 2011 at MPEG 96th in Geneva. The proposals will be evaluated at MPEG 98th meeting in November 2011.

MFC (MPEG Frame Compatible): this adhoc group intends to investigate a coding solution to convey stereoscopic HD full resolution which is compatible with the already deployed Frame Compatible stereoscopic format. Several proposals using existing standards like MVC and SVC are compared, as well as proprietary solutions. A Call for Evidence will take place in July MPEG meeting. Based on the results of this CfE, a CfP could be issued by the group.

2.7 THE SOCIETY OF CABLE TELECOMMUNICATION ENGINEERS (SCTE)

Starting in 2009 the Digital Video Subcommittee (DVS) has initiated the “3D over cable” project aiming to identify necessary changes to existing SCTE standards related to 3D. In 2011 work on a new standard (DVS 1036) defining signaling and encoding parameters for frame compatible stereoscopic 3D has started.

2.8 THE SOCIETY FOR MOTION PICTURE AND TELEVISION ENGINEERS (SMPTE)

The Work Group “WG on 3D Home Master” now belongs to TC-35PM Media Packaging and Interchange. Work is still ongoing with the standard being in a late draft status. Release can be expected in 2011.

All questions related to disparity maps were moved to a new AhG (see section 3.3).

2.9 VIDEO QUALITY EXPERTS GROUP (VQEG)

As a joint activity of ITU-T and ITU-R experts the Study Group work in the field of video quality assessment. For mid 2011 experiments on the influence of crosstalk on stereoscopic screens are planned.

2.10 WIRELESS HOME DIGITAL INTERFACE (WHDI)

With version 2.0 WHDI now fully supports all 3D formats of HDMI 1.4a and also 1080p60x2.

3 MUSCADE CONTRIBUTIONS TO STANDARDISATION BODIES AND INDUSTRY CONSORTIA

3.1 INTERNATIONAL COMMITTEE FOR DISPLAY METROLOGY (ICDM)

HLGR has made several contributions to the IDMS (Information Display Measurement Standard) prepared by the ICDM-3D working group (International Committee for Display Metrology). These contributions are: a new introduction chapter for light-field displays, merging information from the previous introduction; several display measurement methods including 3D geometry distortion, angular resolution, field of view and valid viewing area. The resolution measurement proposed by other

contributors has been simplified and updated, so it became 2D and equivalent resolution measurement, which has been now accepted in the draft. Holografika also shared a 3D test pattern to be used in the evaluation of 3D displays. These contributions have been accepted, and the final draft is under review before publishing the first version of the IDMS standard.

3.2 MOVING PICTURE EXPERTS GROUP (MPEG)

DRZ submitted a contribution to the MPEG meeting in Geneva in March 2011 entitled “Image Domain Warping as Alternative to DIBR for Advanced 3DV Applications” (m19995). This document described the algorithms for depth impression adjustment and multiview conversion based on image domain warping recently developed by DRZ. It also suggested changes to the MPEG “Call for Proposals on 3D Video Coding Technology” (CfP), and made general comments to business use cases and resulting requirements on multiview conversion in the future. Furthermore, DRZ demonstrated results of the proposed technology related to the CfP on the MPEG meeting site in Geneva. For that purpose an autostereoscopic display was transported to Geneva. In several subjective viewing sessions, MPEG experts evaluated the quality of the results in an informative way.

The input raised a lot of attention within MPEG. The results were considered highly promising by many experts, moreover given the fact that they were generated fully automatically. After discussion, MPEG decided to change the CfP text as suggested by DRZ, and to remove mandatory usage of depth maps in the proposals. This now opens the way to submission of a proposal by DRZ and potentially other MUSCADE partners to the MPEG CfP including the developed technology.

3.3 THE SOCIETY FOR MOTION PICTURE AND TELEVISION ENGINEERS (SMPTE)

THO has launched and chaired regular conference calls in the newly created SMPTE/10e-disparity group aiming at standardizing a dense disparity map professional format on the production and post-production side. THO has initiated a strawman document proposal. This document is based on previous contributions from THO and is being enriched by discussions with other SMPTE members during weekly calls. When finalized, this document will provide a standard for data representation of disparity maps for use in exchanges between stereoscopic 3D production and mastering systems

4 SUMMARY AND CONCLUSIONS

Standardization activities related to 3D in particular in the field of frame compatible stereoscopic 3D video becomes more and more mature. While one year ago many organizations still investigated whether an engagement makes sense in their particular field meanwhile all have started to keep up with the ongoing changes. Early movers, and here in particular MPEG, but also SMPTE have widened their activities already looking beyond the frame compatible area.

Based on their work in Muscade several partners have contributed to standardization bodies. An AhG within SMPTE is chaired, the current CfP of MPEG-3DVC has been influenced opening the possibility of a submission and contributions have been made to ICDM.



Ref : MUS.RP.00023.HHI
Issue : 01 Rev. : 0
Date : 30/06/2010
Page : 9

Additional input from Muscade can be expected in the future. A next test-shoot is planned which can lead to appropriate test material. The offline Phase-I prototypes are currently evaluated promising valuable insights which also might help in standardization.



Ref : MUS.RP.00023.HHI
Issue : 01 Rev. : 0
Date : 30/06/2010
Page : 10

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