Meeting, date:	**Singapore, Singapore, 10-13 December 2012**
Source:	**Video Quality Experts Group (VQEG)**
Title:	**Collaboration The International Committee for Display Metrology (ICDM)**

LIAISON STATEMENT

For action to: The International Committee for Display Metrology (ICDM)

Approval: VQEG

Deadline: None

Contact:	Arthur Webster NTIA/ITS USA	Tel: +1 303 497 3567 Fax: +1 303 497 5969 Email: webster@its.bldrdoc.gov
Contact:	Kjell Brunnström Acreo AB Sweden	Tel: +46-8-632 77 32 Fax: +46-8-632 77 10 Email: kjell.brunnstrom@acreo.se

The Video Quality Experts Group (VQEG) thanks the International Committee for Display Metrology (ICDM) for the information about the successful completion of the ICDM Information Display Measurements Standard (IDMS1). This will help to solve the needs of the display industry and also for VQEG to have a single top-notch reference standard for how to measure and characterize displays. VQEG is convinced that it will be very valuable when conducting video quality experiments, since the display is so crucial and being able to characterize it in a good way is essential.

VQEG has worked with the evaluation and development of both objective and subjective video quality assessments since 1997. There is definitely a complementary nature between the organizations VQEG and ICDM, which could benefit from collaborating especially when it comes to the interaction between the display and internal display video processing and the video signal. VQEG has mostly concentrating its efforts on the video signal, that is coding and transmission errors, where the display in many cases has been considered as a transparent device. In contrast to this the 3DTV project has put in quite an effort into the characterization of crosstalk. The interaction between the audio and visual information have been a part of the issues that have been studied and are under study by some projects within VQEG.

Current projects are (www.vqeg.org):

- 3DTV
- Audiovisual HD (AVHD)
- HDR (High Dynamic Range Video)
- Hybrid Perceptual/Bitstream
- JEG-Hybrid
- MOAVI (Monitoring of Audio Visual Quality by Key Indicators)
- Quality Recognition Tasks (QART)
- RICE (Real-Time Interactive Communications Evaluation)
- Ultra HD

Attached is a document covering the recent progress within VQEG during 2012

VQEG project's Recent Progress 2012

Audiovisual HD Quality (AVHD)

Co-chairs: Margaret Pinson (NTIA/ITS), Chris Schmidmer (Opticom), Quan Huynh-Thu (Technicolor)

The AVHD Quality project seeks to benchmark quality metrics suitable for either:

- Video-only quality in HD resolution, or
- Audio-visual quality of HD videos with accompanied sound

The AVHD group is the direct successor of the former individual projects HDTV 2 and Multimedia 2. The scopes of the two projects are very similar and a lot of synergies between the former projects is expected. The new group AVHD with a broadened scope has therefore been established.

The AVHD group is currently in the middle of defining appropriate test plans for the benchmark test. A first overview can be found in the project synopsis document of the former multimedia 2 project: This document is specific for audio-visual quality. Except for the audio component, most of the content will be valid for the video-only metrics as well.

The Audio-visual HD group also investigates improved audiovisual subjective quality testing methods. This effort may lead to a revision of ITU-T Rec. P.911. Presentations on this topic are encouraged at all VQEG meetings.

Hybrid Perceptual/Bitstream project

Co-chairs: Jens Berger (SwissQual), Chulhee Lee (Yonsei University)

The goal of the hybrid project is to develop hybrid models (FR, RR, NR), which use bit stream data as well as processed video sequences. The models were designed to perform accurate and fast quality monitoring of various video services. Four proponents have submitted models and the validation process is under way. It is expected that validated models will be determined in June or July this year.

Recent activities:

- Models were submitted on 6th June 2012
- Regular audio calls have been held
- Source sequences were reviewed.
- PVS and PCAP file generation was discussed and agreement was made.
- Schedule was revised.
    - Test Design: Dec. 31, 2012
    - PVS creation: Feb. 28, 2012

Short term plan:

- Objective score submission by end of April, 2013
- Subjective testing, finished by end of April, 2013
- Draft final report July, 2013

JEG-Hybrid

Co-chairs: Marcus Barkowsky (IRCCyN), Lucjan Janowski (AGH University), Nicolas Staelens (Ghent University-iMinds-IBCN)

Progress is delayed due to overlap with the Hybrid validation test. An automated algorithm is being developed to automate source selection (e.g., amount of movement). HRC encoding parameters have been discussed, and HRC creation is underway. Tool development improvements have occurred, as a defect in the packet loss algorithm was detected by Acreo. Several students are working toward a Hybrid metric. PVSs will be available to run models soon.

Monitoring of Audio Visual Quality by Key Indicators (MOAVI)

Co-chairs: Silvio Borer (SwissQual), Mikolaj Leszcuk (AGH University), Emmanuel Wyckens (Orange Labs)

- Implementation of 7 metrics for following artifacts:
    - Blockiness
    - Blur
    - Exposure time distortion
    - Noise
    - Framing
    - Freeze
    - Blackout
- Initial values of thresholds for particular metrics were settled
- Development of metrics for audio artifacts (mute and clipping) in Matlab environment
- Development of metrics for block loss and interlace artifacts in Matlab environment
- Preliminary tests of subjective opinion with the purpose of improving the approach to thresholds
- Design and construction of the website where the metrics are publicly available (vq.kt.agh.edu.pl)
- Writing paper regarding MOAVI project for VPQM conference in Arizona

Quality Recognition Tasks (QART)

Co-chairs: Joel Dumke (NTIA/ITS), Mikolaj Leszczuk (AGH University)

As the project's objective is to develop statistical models that will be able to estimate the quality of a video with regards to its usefulness in discerning visual information, for this purpose, some data must be

gathered, which includes results of automatic quality assessment and recognition rates from experiments involving humans. This part of the project concentrates on performing calculations with objective measures and writing the results to a database.

A massive database has been created, storing several parameters coming from two different experiments: recognition of license plates in a parking lot, and recognition of different objects in different scenarios. Both experiments have been converted into a common format, as far as possible. In total, there are:

- 126 SRCs -> original video sequences
- 130 HRCs -> sequences modified (cropping, compression...)
- 1860 PVS -> derived clips
- 32284 answers (data: rows in the database)

This database is available in order to get parameters from there (such as bitrate, resolution...), and also to update it with other parameters (which need to be calculated).

Apart from that, all this data has been converted into a single numerical matrix in Matlab which will be the base for starting the modelling process.

Quality evaluation must focus on the areas where essential information is found. Some work has been done on following selected objects. It can be achieved in quite a simple way when standard foreground determination is possible. However, the method should also enable tracking in case of unstable background, and the objects may be nested in larger ones. For this reason, another approach tried was the use of optical flow. The implementation of this method found in Matlab did not ensure sufficient accuracy. A more sophisticated algorithm is needed to reliably accomplish the task. Probably the best way to overcome the problem is to use a function from the OpenCV library.

There was also some attention paid to additional tools, like Kalman filter, which will be used to improve the accuracy and correct random errors. Methods of keeping track of multiple interacting objects were also analysed in case they are needed in the future.

To connect Matlab code to database, external Java driver had to be installed and some configuration done.

Available data about target recognition results is heterogeneous. Its structure is not certain at the moment, so the code for accessing it could not be completed. However, some of the design questions have already been resolved.

Real-Time Interactive Communications Evaluation (RICE) project

Co-chairs: Kjell Brunnström (Acreo), Dave Hands (Skype/Microsoft)

Kjell Brunnström was elected as Co-chair at the meeting in Singapore 2012, otherwise no activities and no progress.

Ultra HD

Co-chairs: Vittorio Baroncini (FUB), Osamu Sugimoto (KDDI Labs)

Project started end 2012

3DTV

Co-chairs: Marcus Barkowsky (IRCCyN), Patrick LeCallet (IRCCyN), Quan Huynh-Thu (Technicolor)

Has three activities: (1) viewing environments, (2) ground truth for subjective testing methodologies and scales, and (3) objective model validation. 3DTV subjective tests to address (1) and (2) are being run in different laboratories, under the coordination of IRCCyN.

The current status of these activities is as follows:

1. Viewing environments:
    - The purpose is to investigate the influence of viewing environment, test set-up and display equipment on subjective quality:
    - A unique set of 3D test sequences (COSPA dataset) will be used by different research labs
    - Each test lab will study variables related to viewing environment/display equipment, and report experimental results for comparison with other labs' results
2. Subjective quality testing methodologies and scales for stereoscopic 3D video:
    - The first step is to conduct a large-scale experiment using the pair-comparison methodology, as it is expected that human observers can provide easily and confidently a judgment of overall preference.
    - The second step will use the results of the pair-comparison testing as a ground truth database to investigate which more time-efficient subjective testing methodology and/or scales can be used to predict the results of the pair-comparison test, as well as which perceptual dimensions can be judged.
3. Objective video quality metrics for stereoscopic 3D:
    - A first step will evaluate only full-reference metrics for picture quality of S3D video: 3D viewing experience is related to several perceptual dimensions such as visual quality, depth rendering (depth quality, depth quantity), and visual comfort. This first phase of evaluation will focus on the visual quality dimension and evaluate full-reference media-layer metrics (use of decoded pixel information) to predict/monitor this visual quality at the head-end.
    - This work will progress in parallel with the work on subjective testing methodology.
    - Discussions currently cover the development of a test plan and terms of reference

High Dynamic Range (HDR)

Co-chairs: Phil Corriveau (INTEL), Patrick LeCallet (IRCCyN)

Proposal on to produce tone-mapped PVSs, and run previously validated FR models on them. There is a problem: what should be used as the original video? The desire is to use this as a starting point (e.g., model in its entirety, or individual parameters)

Independent Lab Group (ILG)

Co-chairs: Phil Corriveau (INTEL), Margaret Pinson (NTIA/ITS)

ILG is focused on assisting the Hybrid effort. Scene selection nears completion.

Joint Effort Group (JEG)

Co-chairs: Alex Bourret (ip-label), Kjell Brunnström (Acreo), Patrick Le Callet (IRCCyN)

Promotes the idea of joint collaboration within VQEG. Discussions are underway on how to increase visibility. Proposal is to change VQEG group names to reflect whether or not the effort is currently collaborative, through a "JEG-" prefix

Tools and Subjective Labs Setup

Co-chairs: Glenn Van Wallendael (Ghent University-iMinds-Multimedia Lab), Nicolas Staelens (Ghent University-iMinds-IBCN)

Has nothing new to report. See the VQEG website for available tools.