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BUSINESS PLAN FOR JTC 1/SC 29

PERIOD COVERED: November 2012 – October 2013

SUBMITTED BY: ISO/IEC JTC 1/SC 29 Chairman

1.0 MANAGEMENT SUMMARY

SC 29 has been working on: **Coding of Audio, Picture, Multimedia and Hypermedia Information.**

SC 29 has Advisory Group on Management, Maintenance Task Force and two active Working Groups below.

WG 1: Coding of Still Pictures

WG 11: Coding of Moving Pictures and Audio

SC 29 has 25 P-members and 16 O-members.

In this period, SC 29 held one SC Plenary meeting, WG 1 held four WG meetings, and WG 11 held four WG meetings. The numbers of participants are shown below.

- SC 29: 26th SC 29 Plenary meeting (22)
- WG 1: 59th meeting (54), 60th meeting (27), 61st meeting (38) and 62nd meeting (46)
- WG 11: 102nd meeting (449), 103rd meeting (322), 104th meeting (455) and 105th meeting (400)

Since November 2012, SC 29 had many ballots and new standards. The statistics of the ballots and publications should be summarized before submission of this business plan to JTC 1.

1.1 CHAIRMAN'S REMARKS

The chairman appreciates the active participation and significant work of the members in this period. The standards developed by SC 29 have been widely deployed in many services employing digital media both traditional and new. The ways of consuming digital media have become various and pervasive. Smartphones with high-speed mobile link, tablet devices with wireless functionalities and large screen with higher resolution beyond HDTV are going to change how people can enjoy the media. SC 29 is continuing its work on the development of standards to serve the industry and to provide new and excellent user-experience through widest use of digital media information.

WG 1 has completed the working drafts of JPEG extensions including the support of High Dynamic Range (HDR) that is JPEG backward compatible. Part-1 of the work item specifies a core coding system that reflects the most popular use cases of our legacy JPEG standard. Part-2 carefully extends the core coding system for high-dynamic range data, still allowing legacy applications access to low dynamic range version of the image contained within. This standard is important since the uses of HDR capturing devices have become pervasive, but the image coding systems in use are predominately JPEG based due to economy of scale in hardware.

WG 11 has completed the new High Efficiency Video Coding (HEVC) standard that has been promoted to Final Draft International Standard (FDIS) status. The standard reduces by half the bit rate needed to deliver high-quality video for a broad variety of applications. Developed jointly with the Video Coding Experts Group (VCEG) of ITU-T WP 3/16, the HEVC standard will be formally referenced as ISO/IEC 23008-2 in ISO/IEC and as a new addition to the H series of Recommendations in ITU-T.

The HEVC standard specifies three important profiles: the "Main Profile", "Main 10 Profile", and "Main Still Picture Profile". Mass-market consumer video products that historically require only 8 bits of precision in their processing will be based primarily on the "Main Profile" while the "Main 10 Profile" supports up to 10 bits of processing precision for applications with higher quality demands. The "Main Still Picture Profile", the first of its kind to emerge from a WG 11 video coding standard, leverages the underlying technology of HEVC so that it can be used for still image applications as well.

The MPEG-M eXtensible Middleware (MXM) API technology specifications (ISO/IEC 23006-2) have reached the status of International Standard. MXM specifies the means to access individual MPEG tools through standardized APIs and is expected to help the creation of a global market of MXM applications that can run on devices supporting MXM APIs in addition to the other MPEG technologies. The MXM standard should also help the deployment of innovative business models since it enables the easy design and implementation of media-handling value chains. The standard also provides reference software as open source with a business friendly license.

WG 11 has completed the new Augmented Reality Application Format (ARAF) standard that has been promoted to Final Draft International Standard (FDIS) status. In line with the other MPEG-A (ISO/IEC 23000)

standards, ARAF integrates a number of existing standards such as MPEG-4 part 1 (Systems), MPEG-4 part 11 (Binary Format for Streaming – BIFS), MPEG-4 part 16 (Animation Framework eXtension – AFX) and MPEG-V (Media Context and Control). ARAF covers from location based to realistic visual augmentation applications and services and it is suitable for AR applications that need high compression and streaming of 3D objects and integrated sensors and actuators capabilities.

WG 11 has started a new work on energy-efficient media consumption (Green MPEG). Green MPEG is envisaged to provide interoperable solutions for energy-efficient media decoding and presentation as well as energy-efficient media encoding based on encoder resources or receiver feedback. This should be done without any degradation in the Quality of Experience (QoE). The responses to the Call for Proposals include technologies such as: codec dynamic voltage/frequency scaling, display adaptation, adaptive streaming, interactive power saving requests and cross-segment decoding. WG 11 will continue to investigate these technologies and develop standards.

WG 11 has also started a new work on MPEG-H 3D Audio. Key functional areas include a bit-efficient representation of multi-channel audio content having a true three-dimensional sound scene, and the ability to flexibly render the audio program to a fewer number of loudspeakers, while maintaining the same sense of envelopment.

WG 11 have continued their promotional efforts. The web site at <http://mpeg.chiariglione.org/> gives a comprehensive view of the activities and results that includes a selection of video tutorials on some of their most recent standards.

Other noteworthy works in this period are described in 2.0 PERIOD REVIEW.

1.2 JTC 1/SC 29 STATEMENT OF SCOPE

There is no change of the SC 29 title and scope. The current title and scope of work are:

Title: Coding of Audio, Picture, Multimedia and Hypermedia Information

Scope: Standardization of coded representation of audio, picture, multimedia and hypermedia information - and sets of compression and control functions for use with such information - such as

- Audio information
- Bi-level and Limited Bits-per-pixel Still Pictures
- Digital Continuous-tone Still Pictures
- Computer Graphic Images
- Moving Pictures and Associated Audio
- Multimedia and Hypermedia Information for Real-time Final Form Interchange
- Audio Visual Interactive Script ware

Excluded: Character Coding

1.3 PROJECT REPORT

Detailed Programme of Work should be available on the SC 29 web site (<http://www.itscj.ipsj.or.jp/sc29/>).

1.4 CO-OPERATION AND COMPETITION

SC 29 maintains many liaisons with other organizations to meet the requirements and expectations of the standards users from the other communities. The latest status of the formal liaisons is to be confirmed and be reported. SC 29 continues productive collaboration with ITU-T. The Joint Photographic Experts Group (JPEG), the Joint Collaborative Team on Video Coding (JCT-VC) and the Joint Collaborative Team on 3D Video (JCT-3V) are the current joint activities we share with ITU-T/SG 16. HEVC, as mentioned in 1.1, is the latest result from our collaboration. SC 29 has initiated a collaborative work with SC 24 on Mixed and Augmented Reality Reference Model. This framework encompass various applications where mixed and augmented reality technologies are considered as new features and may cover different domains including broadcast and telecommunications. A Joint Ad hoc Group (JAhG) with SC 24 has been established for this work. WG 11 has provided contributions to and participated in the April and July face-to-face meetings of the JAhG . Several versions of a Working Draft of Mixed and Augmented Reality Reference Model have been produced.

See SC 29 Web site (<http://www.itscj.ipsj.or.jp/sc29/29w2l.htm>).

2.0 PERIOD REVIEW

[WG 1]

JPEG Part 6 has been published. This standard serves the needs of the digital printing industry, to ensure that applications developed for printing systems can exchange JPEG images. The standard specifies a minimum set of JPEG features to establish a well-defined common basis for the interchange of JPEG images amongst its printing-related products. Some of these assumptions and basic set of features include support for:

- a color space for one, three, and four component images;
- component ordering for images with either three or four components;
- color encoding for images encoded with either three or four components;
- a reference value for both black (zero) and white (255) for single component images;
- a reference value for white for images encoded with either three or four components.

A new amendment to JPEG 2000 Part 11 - Wireless has been published, which supports IP based wireless networks. This Annex provides a virtual interleaving mechanism to increase robustness against data packet losses and erasures. Error protection techniques, such as Unequal Error Protection or any method described in the EPC marker segment, described in this amendment can be applied independently.

[WG 11]

MPEG-4 Part 12 Amendment 4 and new Part 30 have reached the stage of committee drafts. The former specifies a generalized design for the carriage of all video overlays, while the latter specifies the implementation of such a design for two timed text formats: W3C TTML derivatives (including SMPTE Timed Text), and WebVTT formats. The visual overlay includes support of overlays such as subtitles, captions, and other timed text and graphics. The types of text include but are not limited to: basic text, and XML-based text. The graphics support includes bitmaps and fonts, as well as enabling support for other graphics formats, such as scalable vector graphics.

WG 11 has been working on the standardization of a Multimedia Preservation Application Format (MPAF), considering the importance for the preservation of digital multimedia used in many different domains including cultural heritage, scientific research, engineering, education and training, entertainment, and fine arts. The responses to the Call for Proposals showed that MPEG has wide range of technologies to be used for multimedia preservation such as Professional Archival Application Format, MPEG-21 Digital Item Description Language and various MPEG-7 audio-visual descriptors. MPEG will continue to evaluate submissions and develop the standard by integrating its technologies in (MPAF).

The 2nd edition of MPEG-V, which specifies the architecture and associated representations to enable communication between digital content and virtual worlds with the physical one, as well as information exchange between virtual worlds, has been finalized. MPEG-V may be used to provide multi-sensorial content associated to audio/video data, and to control multimedia presentations and applications by using advanced interaction devices.

WG 11 has selected technologies for 3D Audio, Part 3 of MPEG-H based on responses to the Call for Proposals. This work is envisaged to provide a highly immersive audio experience by the rendering of a realistic and compelling 3D audio scene. The selected technologies support content in multiple formats: channel-based, channels and objects, and scene-based Higher Order Ambisonics. At the highest bitrate of 1.2Mb/s for the coding of a signal supporting a 22.2 loudspeaker configuration, the technologies have achieved excellent quality.

2.1 MARKET REQUIREMENTS

From WG 1, JPEG has been widely used in digital photography. Lots of JPEG-coded images are produced and millions of pictures are shared every day among friends and family in e-mails, photo-hosting websites and the enormously popular social networking sites.

JPEG 2000 is used for digital photography, photo IDs, satellite images, medical images and Digital Cinema services for nearly all digital cinema screens at theatres.

JPEG XR offers the potential of producing high-quality, high dynamic-range images. JPEG XR is already widely deployed in PC industry. JPEG XR is used in cameras and printers as well.

JPEG XT with High Dynamic Range capabilities is awaited by the digital camera industry. This new specification is going to be applied to the devices for digital cameras.

From WG 11, MPEG-4 Part 10 Advanced Video Coding (AVC) has been widely used for digital broadcasting systems, visual communication equipment, IPTV servers and terminals, optical video discs, surveillance systems, digital video recorders, mobile devices and so on. Multi-view Video Coding (MVC), Stereo High Profile is used for stereoscopic 3D applications.

MP3 (MPEG-1 audio layer3), Advanced Audio Coding (AAC), HE-AAC have been used for digital broadcasting, mobile handsets and various audio players. Audio Lossless Coding (ALS) is used for high quality applications. Unified Speech and Audio Coding (USAC) is used for generic applications such as unidirectional, conversational, communication, broadcasting, and playback types of applications.

MPEG-7, with Compact Descriptors for Visual Search (CDVS) is expected to provide an excellent solution to search, detection and retrieval over large-scale databases and resources on the web. It can be used in Augmented Reality (AR) type applications and integration in the second edition of ARAF is ongoing. Applications of CDVS in more generic applications such as robotics, automotive, geolocation etc. could also be foreseen.

Dynamic adaptive streaming over HTTP (DASH) provides the standardized streaming protocol in emerging web-based video delivery to new generation TV sets including mobile devices.

High Efficiency Video Coding (HEVC) was developed to achieve major savings (e.g. reduction by about half for 720p HD and higher resolution progressive-scan video) for equivalent visual quality relative to the bit rate needed by the widely used AVC standard. For high resolution video, where such additional compression is most urgently required, implementations of the current first version of the standard are already meeting or exceeding the targeted goal. Therefore, it is expected that HEVC will be widely used for HD class applications both for home and mobile environment and even more for Ultra HD applications. At least one 4K Ultra HD broadcasting service has begun in 2013.

2.2 ACHIEVEMENTS

See SC 29 Web site (<http://www.itscj.ipsj.or.jp/sc29/>).

2.3 RESOURCES

Sufficient resources are available for JPEG, JBIG-2, JPEG 2000, JPSearch, AIC, JPEG XR, MPEG-2, MPEG-4, MPEG-7, MPEG-21, MPEG-A to MPEG-E, MPEG-H, MPEG-M, MPEG-V, MPEG-U and MPEG-DASH projects.

2.4 ENVIRONMENTAL ISSUES

SC 29 has been working on standardization of efficient representation and control of multimedia information. The standards should provide the most effective and quality-preserving ways to handle that information, so that they would save storage capacity, transmission bandwidth and so on. Green MPEG, mentioned in 1.1, is an attempt to further enhance the energy-efficient aspect of media generation and consumption.

SC 29 encourages its WG members to choose tools and schemes for their work, which have less negative impact on environments as far as the consensus of the members is reached. SC 29 also encourages its WG members to consider good trade-off of performances and complexity of their algorithms as one of evaluation criteria, so that it allows less energy-consuming implementation and potential competitiveness of the standards.

2.5 PARTICIPATION METRICS

Meeting: <http://www.itscj.ipsj.or.jp/sc29/29w2meet.htm>

Ballot: <http://www.itscj.ipsj.or.jp/sc29/29w2ballot.pdf>

3.0 FOCUS OF NEXT WORK PERIOD

[WG 1]

JPEG extension works continues in the context of JPEG XT. This new part of the JPEG standard is in line with WG 1's strategy to serve more intensively the JPEG ecosystem. JPEG XT features the original JPEG standard with support for High Dynamic Range image compression, lossy-to-lossless coding and privacy tools.

WG 1 works on enhancement of JPSearch standards. The standards have JPSearch Query Format to query image repositories. The expected outcome is a JPSearch API complementary to the JPSearch Query Format.

[WG 11]

The work on range extensions to Part 2 of MPEG-H₂ HEVC, is ongoing. The first extension will support HEVC video coding using alternative color formats such as the 4:4:4 "full color" format needed for high-quality encoding of content that may include a mixture of text, graphics, and video, and also the 4:2:2 horizontally-subsampled color format used in many professional studio video applications. The range extensions will also extend HEVC to support higher-precision video content, with sample precisions up to 12 bits and beyond. The work on the range extensions will be completed in January 2014.

The work on stereo and multiview extensions to HEVC will also be completed in January 2014, providing better compression in cases where the same scene is captured by two or more cameras. This design will enable HEVC-based high-quality 3D video coding, again cutting the bit rate by 50% or more compared to existing AVC based products and services for 3D television and 3D Blu-ray discs. As already supported in AVC, further HEVC extensions including depth maps are currently investigated to support 3D experiences beyond today's stereoscopic 3D. It is expected that by using more dedicated compression technology HEVC will provide further savings in bit rate for such applications.

Further extensions of HEVC are currently under development for scalability – e.g. supporting backward compatible upgrading of services and graceful degradation in error-prone transmission. This work is targeted for completion in July 2014.

The three initial sets of extensions to HEVC (i.e., the range extensions, stereo/multiview extensions, and scalability extensions) is also likely to result in the identification of needs for further work in these areas beyond that scheduled for completion in 2014.

The work on MPEG-H 3D Audio is ongoing. WG 11 commits to a short standardization timeline to produce Version 1 of MPEG-H 3D Audio that is focused on higher bitrates (e.g. 1.2Mb/s to 256kb/s) with the Committee Draft, Draft International Standard, and International Standard expected to be complete in March 2014, July 2014, January 2015, respectively.

WG 11 will standardize Multimedia Preservation Archival Format by April 2014. This standard should define the standardized description to multimedia content to enable users to plan, execute and evaluate preservation operations to achieve the objectives of digital preservation.

The work on Augmented Reality Application Format continues aiming at ARAF 2nd edition. This will incorporate new MPEG technologies such as, 3D Audio and 3D Video, Compact Descriptors for Visual Search (CDVS) and User description.

Progress is expected also in the work on Green MPEG that is expected to lead to an International Standard in 2015.

In summary, SC 29 works on high quality coding of media content that include audio video, 3D graphics and ancillary information sources such as sensors and actuators and their combinations in Application Formats in order to support production, circulation, access and new ways of distribution and consumption such media. Further work is under way to continue serving industry and users.

3.1 DELIVERABLES

See SC 29 Web site (<http://www.itscj.ipsj.or.jp/sc29/>).

3.2 STRATEGIES

SC 29 will continue to provide information on the progress of standardization work to the public through SC's and WGs' web sites below as well as press releases, white papers or awareness events in order for attention to be paid to the area of the multimedia information technology. SC 29 should pay attention to minimize the risk of malicious attacks to its web sites.

SC 29: <http://www.itscj.ipsj.or.jp/sc29/>

SC 29/ WG 1: <http://www.jpeg.org/>

SC 29/WG 11: <http://www.chiariglione.org/mpeg/>

SC 29/WG 11 (for meeting): <http://wg11.sc29.org/>

SC 29 will continue the practice of making their standards containing conformance testing bitstreams and reference software accessible as the freely available standards from ISO/IEC. SC 29 is pleased to hear the requirements from the industry, so that appropriate WG under SC 29 would study and work in case of observing good opportunities to deliver the standards that meet the requirements.

3.2.1 RISKS

SC 29 identifies three possible risks:

- Lack of participants: Two working groups currently have enough resources (WG 1: 25, WG 11: 300 people), however SC 29 should constantly monitor attendance of WGs.
- Management of documents: The WGs depend on having good electronic document repositories and systems and the maintenance of these is important for the efficient working of the WGs. Currently such repositories and systems are operated and maintained by the WG members and SC 29 Secretariat.
- Risk associated with the uncertain presence of applicable patents: Parties attempting to implement the standards may find that patents owned by parties that have not participated in the development process are not available on RAND terms. They may also find that the licensing conditions of the standards that they expected to use in their products are unsuitable to their needs and hence they may feel to be “discriminated” in the use of the standards. These risks is outside the control of SC 29, however SC 29 and WGs continue to encourage their members to submit patent statements expecting that it helps to clarify the potential licensors of applicable patents and to increase the opportunities of licensing under reasonable conditions.

3.2.2 OPPORTUNITIES

Coding of audio, picture, multimedia and hypermedia information provides efficient way to represent, preserve and convey entertainment, art, news, education, record of experiences and so on. People can enjoy any kind of media anywhere they want, employing handheld devices equipped with wireless capabilities. This does not mean just consuming media but generating media as well. The coding technologies have a significant role in any service and activity employing digital media information. SC 29 has been working to standardize coding of multimedia and their control function, interface with other elements, middleware for general and/or specific applications. Many international standards from SC 29 have been adopted and used, and those standards have been contributing to the industry. There are still emerging needs for digital media representation with higher quality or advanced features such as Ultra HD with scalability in some applications, 3D and free viewpoint video with rich media interface. Moreover, pervasiveness of digital information is bringing about new opportunities for the industry to create user experiences built from various media. Regarding these requirements, the industry needs further efficiency in compression, composition, description and manipulation of digital media. Thus, we have a lot of opportunities to fulfill such requirements.

3.3 WORK PROGRAMME PRIORITIES

All items are equally important.

3.3.1 Archival Policy

SC 29 complies with Subclause 14.3 and Clause 15, JTC 1 Standing Document on Electronic Document Preparation, Distribution and Archiving.