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ISO/TC46/SC9 Secretariat

Title: Liaison document: JTC1/SC29 Business Plan Status Report for the period November 2011–October 2012

Source: JTC1/SC29 Secretariat

Project(s):

Status:

Additional information: Also distributed as JTC1/N11233 and JTC1/SC29/N13022.

REQUESTED ACTION

Circulated to P- and O-members, and to technical committees and organizations in liaison for:

☒ information

☐ discussion at
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ISO/IEC JTC 1
Information technology
Secretariat: ANSI (USA)

Document type: Business Plan

Title: BUSINESS PLAN FOR JTC 1/SC 29 for the PERIOD COVERED November 2011 – October 2012

Status: This document is circulated to JTC 1 National Bodies for review and consideration at the November 2012 JTC 1 Plenary meeting in Jeju

Date of document: 2012-10-02

Source: SC 29 Secretariat

Expected action: ACT

Email of secretary: lrajchel@ansi.org

Committee URL: http://isotc.iso.org/livelink/livelink/open/jtc1

BUSINESS PLAN FOR JTC 1/SC 29
PERIOD COVERED: November 2011 – October 2012
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 three WG meetings, and WG 11 held four WG meetings. The numbers of participants are shown below.

- SC 29: 25th SC 29 Plenary meeting (15)
- WG 1: 56th meeting (22), 57th meeting (28) and 58th meeting (28)
- WG 11: 98th meeting (328), 99th meeting (537), 100th meeting (319) and 101st meeting (441)

Since November 2011, SC 29 had one ballot for NP and more than 50 ballots for CD/DIS/FDIS/PDAM/ DAM/FDAM/COR in this period and had sufficient number of participation of P-members. 53 International Standards including 1 TR and 52 IS/AMD/COR were published.

1. 1 CHAIRMAN'S REMARKS

In this period SC 29 has been supported by significantly active participation by the members. The standards developed by SC 29 have been widely deployed in many services employing digital media such as broadcasting, distribution, content production, sharing, gaming, electronic book, audio-visual archive as well as commercial products such as camera, broadcasting receiver, tablet/notebook/desktop PC, mobile phone including smartphone, game machine, recorder, viewer/player, editing software, packaged content and so on. 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 celebrated the 20th anniversary of the JPEG standard (ISO/IEC 10918-1). It is considered to be one of the most successful media standards around. Every day billions of pictures captured by digital cameras and mobile phones are represented in this format. The JPEG specification was published in 1992, the result of a joint initiative of ISO/TC 97/SC 2/WG 8 and CCITT SG 8 at that time respectively.

WG1 is proposing a new work item on developing compression and quality evaluation of High Dynamic Range (HDR) Imaging that is JPEG backward compatible. This standardization work is important as the uses of HDR imaging capturing devices especially in mobile devices have become pervasive, but the image coding systems in use are predominately JPEG based due to economy of scale in hardware. Hence a JPEG backward compatible coding and quality evaluation standard is needed to ensure complete interoperability of HDR images among all capturing devices.

WG 11, at its 100th meeting, celebrated its role in the evolution of the world from an age of media for some, to an age of media for all. The Emmy-award-winning committee that has developed MP3, MPEG-2, MPEG-4, and a host of other ubiquitous standards that have enriched the way humans interact with media, commemorated the milestone of 100 meetings with a gala event that featured leaders from ISO, IEC, ITU, and WIPO; all present to honor 25 years of collaboration toward the common goal of delivering world-changing media technologies. The celebration event focused on the winning recipe: to serve as a collaborative forum for experts to bring their technologies to develop standards that they need, and to be rewarded for those excellent technologies. As a result, MPEG standards have facilitated a revolution in how media are created, distributed, and consumed with profound ramifications in industry, society, and human culture, i.e. digital media are now an integral part of billions of lives, providing a way for making them more interconnected and social.

The High Efficiency Video Coding (HEVC) standard has reached the stage of Draft International Standard. The Joint Collaborative Team on Video Coding (JCT-VC), a joint team of WG 11 and the ITU-T's Video Coding Experts Group (VCEG) has been developing this standard. The draft shows significantly better compression than the current standard, particularly for the case of high-resolution video, where the bit rate

savings can be as large as 50% or more for the same visual quality. HEVC is expected to be submitted for final standardization approval in January 2013, and will be delivered as Part 2 of a new suite of standards known as MPEG-H (ISO/IEC 23008).

HEVC is the latest in a series of video compression standards that began almost 20 years ago with MPEG-1 (ISO/IEC 11172-2) widely used in Video CD, MPEG-2 (ITU-T Recommendation H.262 | ISO/IEC 13818-2) that resulted in the creation of digital television broadcasting and video distribution as it is known today, MPEG-4 Visual (ISO/IEC 14496-2) broadly used in internet-connected and mobile devices, and the Advanced Video Coding (AVC) standard (ITU-T Recommendation H.264 | ISO/IEC 14496-10) which provided a compelling advantage in compression capability compared to MPEG-2 and MPEG-4 Visual by incorporating new advances in the state of the art of compression technology designs.

MPEG-DASH (ISO/IEC 23009-1) has been published. MPEG-DASH is the first International Standard for dynamic adaptive streaming of multimedia content over HTTP, based on work previously published by 3GPP. It provides a rich set of features to support on-demand, live streaming and time-shift services. It also supports streaming of multiplexed or independent streams over the existing Internet infrastructure with efficient use of CDNs (Content Delivery Networks). Since it requires only HTTP servers, existing server solutions can be used for large-scale deployment scenarios such as the delivery of TV content over Internet and mobile networks.

MPEG-A Part 13 (ISO/IEC 23000-13), titled "Augmented reality application format" was promoted to the Committee Draft level. This standard compiles and extends existing MPEG technologies enabling them to: (a) model and efficiently code dynamic, interactive 2D/3D scenes with both natural and synthetic media in a way that is suitable for streaming; (b) access local and remote media resources and support client scene updates transmitted by the server; and (c) represent data from sensors and actuators embedded in the terminal and its environment. This new standard continues WG 11's tradition of serving the multimedia needs of MPEG constituencies, among which are the broadcasting and mobile industries.

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 is available on the SC 29 web site (http://www.itscj.ipsj.or.jp/sc29/).

1.4 CO-OPERATION AND COMPETITION

SC 29 has many liaisons with other organizations to meet the requirements and expectations of the standards users from the other communities. SC 29 has 5 internal Liaisons in JTC 1, 10 internal Liaisons within ISO/TC and IEC/TCs. In addition, SC 29 has 16 Category A Liaisons, 2 Category B Liaisons, and 45 Category C Liaisons. SC 29 has long and productive collaboration with ITU-T. Joint Photographic Experts Group (JPEG) is a Working Group of SC 29/WG 1 and of ITU-T/SG16. WG 11 has developed the widely-deployed MPEG-2 Video and Systems standards as the common texts with ITU-T Recommendations. The Joint Video Team (JVT) under WG 11 with ITU-T/SG16 Video Coding Experts Group (VCEG) has produced twin text standards

AVC including its extensions including Scalable Video Coding (SVC) and Multi-view Video Coding (MVC). The Joint Collaborative Team on Video Coding (JCT-VC) has been actively working on High Efficiency Video Coding (HEVC), a part of MPEG-H. JCT-VC is expected to produce even higher efficiency video coding standard(s) compared to the existing AVC by the factor of 2. It has been agreed that one more Collaborative Team should be established with ITU-T/SG16, which will focus on 3D video. The team will be named as the Joint Collaborative Team on 3D Video (JCT-3V).

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

2.0 PERIOD REVIEW

WG 1 conducts six active projects: JPEG, JBIG-2, JPEG2000, JPEG XR, JPSearch and AIC.

JPEG Part 6 (ISO/IEC 10918-6) Application to printing systems has reached the stage of International Standard. This new part to the original JPEG suite of standards addresses specific requirements of the printing industry and specifies a subset of features and application tools to aid in the interchange of images encoded according to the JPEG image coding standard for printing. WG 1 explores possibilities extending the JPEG standard to enable functionalities such as lossless or high-dynamic range compression in a way that is backwards compatible to existing implementations.

The second edition of the JPEG 2000 multilayer compound image file format (JPM) was approved, which is Part 6 of JPEG 2000. It serves as a file format to represent multipage raster images containing a mixed content, such as photo images, text, or artificially generated figures. With JPM it is possible to represent a multipage mixed-content document in one or multiple files, compressing different parts with different compression algorithms. Among the supported compression algorithms are JPEG and JPEG 2000 for continuous-tone images and JBIG for bi-level imagery.

Technical Report of JPEG XR (ISO/IEC TR 29199-1) was published. It provides a technical overview and informative guidelines for applications of JPEG XR image coding. The overview includes a description of the supported image formats, the internal data processing hierarchy and data structures, the image tiling design supporting hard and soft tiling of images, the lapped bi-orthogonal transform, supported quantization modes, adaptive coding and scanning of coefficients, entropy coding, and the codestream structure.

JPSearch Part 5: Data interchange format between image repositories has been published as an International Standard. This part provides a data interchange format for the exchange of image collections and respective metadata between JPSearch compliant repositories. It enables the synchronization of repositories across different devices and platforms by providing an easy and reliable data transfer mechanism overheterogeneous as well as homogeneous platforms.

Advanced Image Coding and Evaluation Methodologies (AIC) ad-hoc group continues its efforts in defining comprehensive guidelines for the evaluation of image coding technologies in terms of quality, complexity and functionality. It also includes recommendations and application dependent evaluation methodologies for the areas of medical, security and camera sensors imaging.

WG 11 conducts many projects such as MPEG-2, MPEG-4, MPEG-7, MPEG-21, MPEG-A to MPEG-E, MPEG-H, MPEG-V, MPEG-M, MPEG-U and MPEG-DASH.

MPEG-2 Systems (ISO/IEC 13818-1) first published in 1996 has been revised as the 4th edition. Responding to the continuous needs of industry, WG 11 has produced 7 amendments for AVC, SVC, and MVC data, as well as for the support of stereoscopic content, since the 3rd edition which was published in 2006. The new 4th edition will consolidate these previously approved amendments to provide better clarity and reliability.

The latest edition of MPEG-2 Systems supports signaling of various types of stereoscopic content carried in MPEG-2 Transport Stream (TS) including both a frame compatible arrangement (both views for the left and right eyes are carried in a single video frame) and a service compatible arrangement (both views for the left eye and the right eye are carried in the signal, but only one view is used for monoscopic services). The standard also provides signaling of mixed contents having both monoscopic and stereoscopic contents in the same program. As this signaling is agnostic to the use of specific codec, the standard will enable the harmonized signaling of stereoscopic contents in various environments.

WG 11 is going to extend the MPEG-4 file format so that it supports the efficient carriage of HEVC bitstreams for various applications. It is expected to reach FDAM status in April 2013, shortly after the HEVC specification reaches its Final Draft International Standard status.

In advancing the MPEG-7 to the next stage, WG 11 has issued a Call for Proposals on Compact Descriptors for Visual Search (CDVS) in the last period. WG 11 received 9 contributions responding to the call. This new initiative is intended to facilitate the retrieval of images and video based on characteristic similar parts – e.g.

finding the same object in different pictures. Investigation was performed based on a large data set of test examples. Local feature description technology was identified that is able to perform the task with good results. A test model has been developed.

In the context of MPEG-21, WG 11 considered that it is important to provide standard technology helping users to preserve digital multimedia that is used in many different domains, including cultural heritage, scientific research, engineering, education and training, entertainment, and fine arts for long-term across system, organizational, administrative and generational boundaries. WG11 issued a Call for Proposals on Multimedia Preservation Description Information (MPDI) in July 2012. The activity is supported by knowledge and information that: (a) characterizes the material being preserved so that one can assess how well it is preserved; (b) describes what has been done for purposes of preservation; and (c) enables assessment of the success of preservation.

MPEG-C Part 4 (ISO/IEC 23002-4) is going to include new Graphics Tool Library (GTL), which is specific to synthetic 3D graphics. It completes the already standardized Video Tool Library (VTL) in the Reconfigurable Multimedia Coding (RMC) framework. GTL specifies Functional Units (FUs) for the compression of static and animated 3D graphic objects. This technology enables the decoder to be built at the terminal, and possibly reconfigured dynamically at run-time, by connecting the appropriate FUs from the GTL.

MPEG-H Part 1, MPEG Media Transport (MMT) has reached the stage of Committee Draft. To support emerging multimedia applications demanding efficient delivery of coded media content over packet oriented delivery networks, MMT has been designed to provide novel features such as concurrent delivery of coded media over heterogeneous networks, logical packaging structure and composition information to support multimedia mash-up applications, seamless conversion between the formats for storage and for delivery, cross layer interface between the application layers and underlying delivery layers, and format of signaling messages to manage the presentation and optimized delivery of media.

Following MMT and HEVC, WG 11 is planning to work on 3D audio as Part 3 of MPEG-H. WG 11 hosted two workshops focus of this subject. At the workshops, the visions of next generation broadcasting with innovating multichannel sound, requirements on 3D audio, content production of 3D audio and possible applications to interactivity in games have been presented. WG 11 will issue the Call for Proposals on 3D Audio in October 2012.

As described in 1.4 COOPERATION AND COMPETITION, a new collaboration between WG 11 and ITU-T VCEG has started on 3D Video Coding as JCT-3V. The JCT-3V is responsible for developing efficient solutions in the field of 3D video, which have been assessed to be mature for market adoption after several years of exploratory work performed in WG11, including a Call for Proposals in 2011 that drew 23 responses. As a first in a series of 3D video standards that will be developed by JCT-3V, a multi-view video-plus-depth extension of AVC is being developed. The extension has reached the status of Draft Amendment in July 2012 and will be completed in January 2013.

2.1 MARKET REQUIREMENTS

For 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. After DCI (Digital Cinema Initiatives) decided in 2005 to use JPEG2000 for distribution of movies to theatres, SMPTE and WG 1 have worked on DCPs (Digital Cinema Packages) as movie distribution formats to theatres. Recent articles tell the majority of cinema screens is digital and nearly all digital cinema screens use JPEG2000 technology.

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.

For 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 to be used for generic applications such as unidirectional, conversational, communication, broadcasting, play-back 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. Lightweight Application Scene Representation (LASeR) has been used in various services for mobile devices.

Dynamic adaptive streaming over HTTP (DASH) is expected to play a significant role as the standardized streaming protocol in emerging web-based video delivery to new generation TV sets including mobile devices.

The HEVC standard will provide two-times compression over the current state of the art video coding. It will be used for HD class applications both for home and mobile environment and even for Ultra HD applications.

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. SC 29 will encourage 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 will also encourage 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

SC 29 is strengthening interaction and coordination between WG 1 and WG 11. In the next period more co-located meetings are expected to maximize the interactions.

[WG 1]

JPEG is expected to have extensions to enable additional functionalities. One is the aforementioned HDR support which is JPEG backward compatible. Other possibilities include lossless, augmented reality and stereoscopic imaging.

JPEG 2000 has several amendments to be done. Part 1 (Core coding system) is to be enhanced with the updated ICC (International Color Consortium) profile support, bit depth and resolution clarification. Part 9 (Interactive tools, APIs and protocols) is to be amended with UDP transport and additional enhancements.

JPEG XR Part 4 (Conformance testing) will be amended with additional JPEG XR conformance test streams.

JPEG Systems subgroup will support an integrating effort to incorporate all current and future JPEG standards in a system framework. Such framework will enable system functionalities beyond the scope of the incorporated specifications. Application domains such as security & privacy will benefit from this initiative. Moreover, metadata and ontological frameworks are intended to open up a wide range of functionalities and new applications.

[WG 11]

Compact Descriptors for Visual Search (CDVS) will reach the Committee Draft stage in January 2013, as the part 13 of MPEG-7. The test model is being improved at each meeting in terms of memory usage and speed.

MPEG-21 Part 21 Contract Expression Language is expected to reach Final Draft International Standard in October 2012 and will be published in 2013. Further progress in the study on Multimedia Preservation Description Information (MPDI) is expected, including the review of the responses to the Call for Proposals.

Following the part 13 of MPEG-A, "Augmented reality application format," a technical report will be added as a new part 14 “Augmented Reality Reference Model.” This TR is aimed at providing a common understanding of the augmented reality domain, and at specifying the involved actors, terms of reference and use scenarios and is based on a significant body of work carried out by a group of industry and standardisation groups.

JCT-VC continues working on HEVC standardization to enhance coding efficiency with reasonable complexity. After the completion of HEVC version 1 in January 2013, WG 11 has a plan of HEVC version 2. As a possible component of the version 2, WG 11 has issued a Call for Proposals on Scalable Video Coding for HEVC. Progress in other parts of MPEG-H such as MPEG Media Transport (MMT) and 3D audio is expected. MMT is expected to reach Final Draft International Standard status in July 2013.

JCT-3V will work on 3D Video coding technology with significant participation. Both AVC and HEVC will be studied as a basis of 3D extensions.

In summary, SC 29 works on high quality coding of media content that include audio video, 3D graphics but also ancillary information sources such as sensors and actuators with the sets to support the production, circulation, access, new ways of consumption and any other transactions of such contents. Further work is under way to continue to serve 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: 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 which 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: 30, 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. The coding technologies have a significant role in any service employing 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. So far many international standards from SC 29 have been adopted and used for multimedia packaging, broadcasting and delivery, 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, 3D and free viewpoint video with rich media interface. Regarding these requirements, the industry needs further efficiency in compression, composition and description 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.