



ISO/IEC JTC 1 "Information technology"

Secretariat: ANSI

Committee manager: Rajchel Lisa Mrs.



SC 24 Business Plan 2023

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Description

This document is circulated for review and consideration at the November 2023 JTC 1 Plenary.

ISO/IEC JTC 1/SC 24 Business Plan

Computer Graphics, Image Processing and Environmental Data Representation

August 2023, covering:

Past Year (Aug 2022-Jul 2023) and Current Year (Aug 2023-Jul 2024)

1.0 Executive Summary

The current area of work for SC 24 is summarized as:

Standardization relating to:

- computer graphics
- image processing
- virtual reality, augmented reality, and mixed reality
- environmental data representation
- visualization of and interaction with information

Excluded: efficient coding of multimedia

Terms of References for SC 24/WGs are as follows:

SC 24/WG 6 (Computer graphics and virtual reality):

- Standardization of computer graphics functional specifications for application program interfaces to include support for augmented reality continuum (ARC); Standardization of techniques for presentation of ARC multimedia information, including its creation, and support for user interaction; Standardization of interfaces for storage, retrieval, and interchange of ARC multimedia objects; Standardization for graphical information exchange, including computer graphics metafiles and computer graphics device interfaces; Standardization of encodings and language bindings for standards developed within WG 6.

SC 24/WG 7 (Image processing and interchange):

- Development of imaging architectures; Processing of digital images; Interchange and storage of digital images; Terminology related to imaging systems and technologies, imaging reference architectures, imaging system test and evaluation, imaging products and services, image quality, imaging applications, and related safety and security concerns; Imaging techniques within processing and dissemination architectures (including visualization, data products, AR/VR/MR applications, and computer vision); Profiling of generic specifications for use in specific application domains.

SC 24/WG 8 (Environmental representation):

- Define standards for environmental data elements (used in such application areas as networked and stand-alone simulations, 3D visualization, autonomous entity navigation, virtual reality, augmented reality), including characteristics and properties of environmental objects and their relationships in the context of a data representation model; Define standards for data interchange between environmental data providers and consumers; Define standards for spatial referencing and environmental data identification, analysis, and reuse; Define standards and procedures for extending content of SC 24 standards through registration.

SC 24/WG 9 (Mixed and Augmented Reality (MAR) continuum concepts and reference model):

- Reference architectures; Functional specifications; Scene/data representation and interchange formats; Interaction; Registration/calibration process; Multimodal input and output; Remote mixed reality data exchange (cloud/server/client); Device specifications; System performance and evaluation process.

SC 24/WG 10 (Representation and visualization of information for systems integration):

- Develop guidelines and standards for representation and visualization of information for systems integration topics and initiatives in coordination with relevant ISO/IEC and other groups; Support JTC1 Systems Integration requirements and architectures by applying representation and visualization; standards; Propose and maintain common approaches and architectures for representation and visualization.

SC 24/WG 11 (Health, safety, security, and usability of Augmented and Virtual Reality (AR/VR)):

- Health and Safety for AR/VR, including immersion; Ensuring the safe usage of personal protective equipment (PPE) with AR/VR; Hygiene related to AR/VR; Ensuring diversity, equality and inclusion. Business processes and diversity consideration for software/hardware; Robustness of AR/VR devices; Processes related to AR/VR content capture, processing, and postproduction; Cyber security/privacy/online harms specific to AR/VR.

SC 24/JWG 12 (VR/AR/MR based ICT Integration Systems):

- Joint with ISO/IEC JTC 1/SC 36
- Analyze and develop use cases to support requirements for work items in the area of VR/AR/MR based ICT integration systems, Develop standards related to VR/AR/MR based ICT integration systems, Cooperate with other standards groups (including ISO/TC 159, ISO/TC 215, ISO/TC 232, IEC/TC 62, and IEC/TC 100) in analysis and development of use cases and in development of standards.

SC 24/JWG 16 (Formats for visualization and other derived forms of product data):

- Joint ISO/TC 184/SC 4 - ISO/IEC JTC 1/SC 24 - ISO/TC 171/SC 2 WG hosted by ISO/TC 184/SC 4.
- Develop and maintain format and interface standards for 3D visualization of product models, including visualization of different classes of derived information such as geometry, product structure and others.
 - Develop and maintain standards for consumption of data derived from and associated with product models.
 - Develop and maintain standards for interfaces from SC 4 product definition standards.
 - Establish liaison with other standards activities working on information models for 3D visualization.

2.0 Chairperson's Remarks

2.1 Market Requirements, Innovation

- Based on the advancement and expansion of virtual world technologies including the metaverse as a universal immersive virtual world, a requirement has been identified for the safe and efficient generation and use of visual information by enterprises and consumers. This also applies to the expected proliferation of commercial uses of VR/AR/MR technologies for virtual worlds. Innovative solutions to meet the requirement are being addressed by SC 24 Working Groups. The solutions to this requirement are considered to be beneficial to other standards groups and industry, as well as to existing SC 24 standards in the areas of computer graphics; image processing; computer vision; virtual reality, augmented reality, and mixed reality; data representation and sharing of the environment; visualization of information in the environment in which an application is operating; and the integration of virtual worlds in diverse application areas.

2.2 Accomplishments

The status of all standards published by SC 24, along with those under development, may be viewed in the [SC 24 Standards Catalogue](#). There are 17 projects related to X3D, SEDRIS, MAR, smart city visualization, VR/AR safety, and VR/AR/MR based integration that are being progressed. In addition, a TS on haptic simulation in VR and MAR was published this year. In alignment with the SC 24 scope, that in part focuses on VR/AR/MR and their integration technologies in order to support more widespread use of SC 24 standards, JWG 12 was established this year jointly with JTC1/SC 36.

2.3 Resources

The strategies adopted by SC 24 are based on a philosophy of cooperatively working with consortia, as indicated in 2.4.

2.4 Competition and Cooperation (including consortia)

SC 24 continues its cooperative work with other JTC 1 SCs and WGs, ISO TCs, and Industry and Consortia that share common objectives within the scope of the SC 24 work area. These include JTC 1/WG11, JTC 1/WG12, JTC 1/SC 29, JTC 1/SC 36, JTC 1/SC 41, JTC 1/SC 42, ISO/TC 159/SC 3, ISO/TC 184, ISO/TC 211, ISO/TC 215, IEC/TC 100, the Khronos Group, the Open Geospatial Consortium (OGC), the SEDRIS Organization, the Simulation Interoperability Standards Organization (SISO), the Virtual Dimension Center (VDC), the Web3D Consortium, and the World Wide Web Consortium (W3C).

3.0 Working Group Reports

3.1 WG 6: Computer Graphics and Virtual Reality

3.1.1 WG 6 accomplishments

- ISO/IEC 19777-1 Ed. 2 CD X3D Language Bindings – Part 1: ECMAScript; ISO/IEC 19777-2 Ed. 2 CD X3D Language Bindings – Part 2: Java; ISO/IEC 19777-3 DIS X3D Language Bindings – Part 3: C; ISO/IEC 19777-4 DIS X3D Language Bindings – Part 4: C++; ISO/IEC 19777-5 DIS X3D Language Bindings – Part 5: C#.

3.1.2 WG 6 deliverables

- X3D revision has been submitted for publication and is expected to be published later this year.

3.1.3 WG 6 strategies/risks/opportunities/lessons learned

- In cooperation with the Web3D Consortium, create a revised X3D (19775-1 & 19775-2) with changes needed to better support HTML5 while remaining backwards compatible. Additional technical capabilities have been added, including: enhanced sound; access to and support of glTF, physically-based rendering; projective texture mapping. Work on progressing related file encodings to X3D 4.0. Work on progressing 19775-2 and related language bindings to X3D 4.0.
- Provide support for non-HTML environments; X3D EXI encoding, now that the EXI specification is approved by W3C; X3D JSON encoding; HL7 FIHR integration, including metadata; HAnim facial representation; HAnim internal organ representation; a Python language binding for X3D (as 19777-6 is not yet submitted).

3.2 WG 7: Image processing and interchange

3.2.1 WG 7 accomplishments

- Continued development of ISO/IEC 12087-5:1998 (BIIF) Ed. 2; Approved Joint BIIF Profile 2021.2 (JBP-2021.2) for addition to the Registry of Items.

3.2.2 WG 7 deliverables

No standards delivered during 2022-2023.

3.2.3 WG 7 strategies/risks/opportunities/lessons learned

- The need for additional work related to the standardization of computer vision and image processing terminology will be assessed following the initiation of a new project sponsored by the Chinese delegation.
- Registration of an ISO/IEC 12087-5 (BIIF) profile using the “Fast Lossless Extended” (FLEX) compression algorithm (ISO 18381) once it is provided by the U.S.
- Registration of an update to the JBP-2021.2 being made by the U.S. and NATO sponsors of this BIIF Profile.
- Registration of an update to the BIIF Profile for JPEG 2000 version 1.1 (BPJ2K01.10) being made by the U.S. and NATO sponsors of this BIIF Profile.
- An opportunity to provide WG 7 member perspectives and expertise related to imagery, image processing, image quality, and image visualization to the “big data” visualization work being considered by WG 10.

3.3 WG 8: Environmental data representation

3.3.1 WG 8 accomplishments

- Finalized proof version of IS for 18041-5, EDCS language bindings – Part 5: C++; CD stage completed for 18042-5, SRM language bindings – Part 5: C++; WD and NWIP documents balloted for: 18024-5, SEDRIS language bindings – Part 5: C++, and re-issued because some National Bodies were unable to indicate support; NWIP and CD for: Edition 3 of 18026, SRM balloted and CD stage completed; Actively participated in the SISO project for RIEDP (Reuse and Interoperation of Environmental Data and Processes) and in the SISO Study Group on XR; Participated in technical exchanges with OGC’s GeoPose group.

3.3.2 WG 8 deliverables

No standards were issued during 2022-2023.

ISO/IEC 18041-5 expected to be published later in CY 2023 or early CY 2024. ISO/IEC 18042-5 and ISO/IEC 18026 Ed. 3 are anticipated for publication in later part of CY 2024.

3.3.3 WG 8 strategies/risks/opportunities/lessons learned

- The WG 8 strategy is to support the use of WG 8 standards in business application areas that make use of data representing the (natural and/or man-made) environment in which the application is operating; Opportunities for following this strategy exist in standards applying to

networked simulations, autonomous entity navigation, smart cities, health and safety, VR/AR/MR applications, ICT integration systems, uniform application of position, orientation, and spatial reference frames, environmental object semantics and sharing, and processes for generating and exchanging reusable environmental data products.

3.4 WG 9: Mixed and Augmented Reality (MAR) concepts and reference model

3.4.1 WG 9 accomplishments

- PRF for ISO/IEC 3721 (Formerly 3721-1), Information model for mixed and augmented reality content — Core objects and attributes, and ISO/IEC 21145 (Formerly 3721-2), Style representation for MAR; NP approved for ISO/IEC 21134, Benchmarking of integrated indoor localization and tracking methods using dead reckoning.

3.4.2 WG 9 deliverables

- No standards have been issued during 2022-2023

3.4.3 WG 9 strategies/risks/opportunities/lessons learned

- ISO/IEC TR 16088 Constructs for Visual Positioning Systems in MAR still have stayed in stage 20.00 even if the NP was approved on 2022-01-05. In addition, the limit date for publication does not appear in ISO Portal. Therefore, it is required to confirm the limit date and prepare the CD the target date of which is 2023-08-01.
- Improve standardization practices in terms of clarifying the objectives, practical usage, and industrial relevance of the current items and also strategically cultivating new future work items along this line. Actively publicize the MAR reference model (ISO/IEC 18039) and other standards to expand its use in industry. Strengthen liaison activities (Web3D, VRM consortium, W3C, OGC, Khronos group) and collaboration with other SDO's (e.g., IEEE), academic associations (e.g., ACM), and industry fora (e.g., MWC, AWExpo). Identify emerging key strategic areas such as (1) scene graph representation of augmented mutual space for remote collaboration, (2) avatar facial expression representation for remote XR collaboration representation for MAR, etc..

3.5 WG 10: Representation and visualization of information for systems integration

3.5.1 WG 10 accomplishments

- WG 10 was established at the 2020 SC 24 Plenary meeting as a result of SC 24/AG 1 activity on systems integration visualization. Two work items are in progress: Guidelines for representation and visualization of smart cities (TS 5147, approved for publication) and Human Information Data Model for VR-based Smart Cities (AWI 20538).
- Further opportunities for standardization have been identified including the Metaverse, Big Data Visualization and Environmental Information Visualization. Two NWIPs and a PWI will be developed to progress these new work items during 2023-2024. Additional work in areas related to smart cities and digital twins has been discussed but is immature.

3.5.2 WG 10 deliverables

One standard has been published during 2022-2023: Guidelines for representation and visualization of smart cities (TS 5147) with date of 2023-07.

3.5.3 WG 10 strategies/risks/opportunities/lessons learned

- Collaboration with other JTC1 groups and also other organizations (IEC TC100) has been strengthened through participation in JSEG-15 (Metaverse) meetings and contributing to the ISO/IEC Standards for the Metaverse Workshop on 2023-06-18. WG 10 will work with JTC 1/SC 41 /WG 6, JTC 1/WG 11, and SC 42/WG 2 as required to progress potential work items for digital twin, smart cities, and big data.

3.6 WG 11: Health, safety, security and usability of augmented and virtual reality

3.6.1 WG 11 accomplishments

- WG 11 Convenorship has changed from Prof. Fridolin Wild to Doug Stapleton. One work item in progress: ISO/IEC 5927 Guidance on immersion time, set up and usage – DIS has been issued with comment period to conclude in August 2023. The AWI for ISO/IEC 5236 Guidance on ensuring devices enhance use of existing PPE and cleanliness requirements was cancelled with the content becoming an appendix in 5927.

3.6.2 WG 11 deliverables

No standards have been issued during 2022-2023.

3.6.3 WG 11 strategies/risks/opportunities/lessons learned

- Further opportunities for standards have been identified in the following areas and will be explored:
 - Privacy Policy Requirements in Modelling and Simulation
 - Accessible usage of AR/VR/MR products
 - User Experience Design in AR/VR/MR
- Proposals for new work need study/justification periods before initiation of ISO projects.

4.0 Joint Working Group Reports

4.1 Joint Working Group with ISO/TC 184/SC 4 and ISO/TC 171/SC 2: Formats for visualization and other derived forms of product data

4.1.1 JWG16 accomplishments

- ISO/PWI 14306 Industrial automation systems and integration - JT file format specification for 3D visualization: edition 3 becomes a series: ISO/PWI 14306-1 February ballot successful, ISO/PWI 14306-4 February ballot failed, great progress at the 2023 Paris superplenary: ongoing ISO/PWI 14306-2 ballot, ongoing ISO/AWI 14306-1 DIS ballot, ongoing WG consultation for new ISO/PWI 14306-4 Form 4.
- ISO/DTS 23301 ed2 STEP geometry services ready for ballot, pilot under development
- ISO/TR 24464 ed2 Visualization elements of digital twins ready for DTR ballot
- ISO/TR 3151-1 Visualization elements of PLM-MES interface — Part 1: Overview under publication by ISO/CS since 2023-05-25
- ISO/CD 3151-2 Visualization elements of PLM-MES interface — Part 2: 3D error feedback in the plant industry, CD registered since 2022-10-10

4.1.2 JWG16 deliverable

ISO 17506 Industrial automation systems and integration - COLLADA digital asset schema specification for 3D visualization of industrial data published in 2022.

4.1.3 JWG16 strategies/risks/opportunities

- Manage the transition of technical data packages from 2D drawings on paper to 3D annotated models in multiple formats. Joint initiative on Geometry and Topology ontology at ISO/TC 184/SC 4 with WG 12/T 1 geometry and topology; WG 3 Oil, Gas, Process and Power, and JWG 16. DTR in progress. Establish visualization requirements for product and plant data, and in general for Digital Twin, in cooperation with other ISO and IEC committees: ISO/IEC JTC 1/SC 41, ISO/IEC JTC 1/WG 12, ISO/TC 59/SC 13 (BIM) and other SC 24/WGs especially WG 10 and WG 6.

4.2 Joint Working Group with ISO/IEC JTC 1/SC 36

4.2.1 JWG12 accomplishments

- JWG 12 between SC 24 and SC 36 was established in March 2022 through activities of the JTC 1 VR and AR based Education Ad Hoc Group (2017-2019) and its successor JTC 1/AG 13 on VR/AR/MR based ICT integration systems (2019-2021). A project is in progress: Information modelling for VR/AR/MR based education and training systems (CD 9234).

4.2.2 JWG12 deliverables

No standards have been issued during 2022-2023.

4.2.3 JWG12 strategies/risks/opportunities

- Develop standards related to the technologies for VR/AR/MR based ICT integration with other domains, focusing on education and training. VR/AR/MR technologies can be categorized depending on the application. An analysis should be done so that appropriate procedures and

guidelines for these applications can be provided. Several work items, including use cases for VR/AR/MR based education and training from other domains, VR/AR/MR based education and training systems terminology and concepts, reference model, virtual environments model, and virtual human model are being sought to be developed as new work items. Further domains that can use VR/AR/MR technologies are also being studied.