

ISO/IEC JTC 1 "Information technology"

Secretariat: ANSI

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SC 24 Business Plan for 2025 - 2026

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ISO/IEC JTC 1/SC 24 "Computer graphics, image processing and environmental data representation"

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ISO/IEC JTC 1 SC 24 Business Plan for 2025 - 2026

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ISO/IEC JTC 1/SC 24 BUSINESS PLAN 2025 – 2026

1.0 Executive Summary

Title: Computer Graphics, Image Processing and Environmental Data Representation

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

- 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

History

SC 24 was established in 1983, but its roots date back to 1978 when computer graphics standards work took place in ISO/TC 97/SC 21/WG 2, where ISO/TC 97 was the technical committee that had responsibility for information processing standards. The first formal meeting of WG 2, SC 24's predecessor, took place in September 1978 in Bologna, Italy, focused on Graphical Kernel System (GKS). Since then, SC 24 has developed more than 90 standards that span a broad range of computer graphics and visualization technologies. These include ISO/IEC 15948 Portable Network Graphics (PNG), ISO/IEC 14772 Virtual Reality Modeling Language (VRML), ISO/IEC 19775 Extensible 3D (X3D), ISO/IEC 12087-2 Programmer's Imaging Kernel System (PIKS), ISO/IEC 12087-5 Basic Image Interchange Format (BIIF), ISO/IEC 1802x suite of SEDRIS standards, ISO/IEC 11072 Computer Graphics Reference Model, and more recent standards related to VR/AR/MR (ISO/IEC 18038, 18039, 18040, 18520), and smart city visualization (ISO/IEC TS 5147). In current development, there are approximately 15 projects related to X3D, BIIF, SEDRIS, MAR, Smart city visualization, VR/AR safety, VR/AR/MR systems integration, and the metaverse.

In 2018, SC 24 decided to join ISO/TC 184/SC 4 developing industrial data standards in order to address the topic of formats for visualization and other derived forms of product data in creating JWG 16 with the administrative lead by SC 4.

In 2020, WG 10 was established to develop standards that continue the SC 24/AG 1 activity on systems integration visualization focusing on standardisation that combine several or many ICT areas such as smart cities and Metaverse. This practical trend for applied technology standards continued in 2021 with the establishment of WG 11, which aims to address health, safety, security and usability of augmented and virtual reality systems. In 2022, JWG 12 was established to develop standards on Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR)-based ICT systems integration, in collaboration with ISO/IEC JTC 1/SC 36. This work builds on the standardization activities on VR and AR for education previously conducted by JTC 1/AG 13 from 2017 to 2021. ISO/TC 184/SC 4/JWG 16 was established in 2019 to co-work with ISO/IEC JTC 1/SC 24 for standards development in the area of product data visualization.

Markets

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 and for organizations and consumers. This includes the expected proliferation of commercial uses of VR/AR/MR technologies for virtual worlds and the metaverse. Innovative solutions to meet this requirement are being addressed by SC 24 Working Groups. The solutions to this requirement are considered to be relevant and 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 an environment; visualization of information in the environment in which an application is operating; integration of virtual worlds in diverse application areas; and the metaverse.

Benefits

Within its scope, SC 24 standards provide reference models, system architectures and frameworks, data representation and visualization technologies, data formats, information exchange models, programming and user interfaces, and use case generating methods. These functionalities provide relevant industry areas with standard technologies that are necessary for generating efficient, economical, safe, applications and interchangeable data for implementation and simulation of both real and virtual worlds.

Objectives

SC 24 develops standards and conducts standardization activities under the scope of SC 24 that are in alignment with the umbrella organization of JTC 1. SC 24 standards are developed so that industries in its scope can in turn develop and provide standardized application services in the fields relating to computer graphics; image processing; environmental data representation; mixed and augmented reality; VR/AR security, safety, reliability, and usability; VR/AR/MR systems integration; data visualization; and the metaverse. SC 24 collaborates with other standards development organizations to develop internationally agreed upon standards. SC 24 also makes efforts to ensure that SC 24 standards are widely used in the industries in its scope.

2.0 Environment

WG 6

WG 6's efforts on Computer Graphics and Virtual Reality are broad and impactful, centered on the X3D and HAnim standards. The Extensible 3D (X3D) Graphics International Standard (IS) is the open, royalty-free International Standard for publishing, viewing, printing, and archiving interactive 3D models on the Web. The Humanoid Animation (HAnim) International Standard includes full-fidelity representations for skeleton and skin of the human body, with multiple mechanisms for motion animation of articulated humans. Careful technical evolution with dependable backwards/forward compatibility have led to continuous interoperability of interactive 3D models since the advent of the original Virtual Reality Modeling Language (VRML) standard in 1997. The X3D and HAnim standards offer many opportunities for shared publication, demonstration and presentation by a variety of diverse ISO/IEC standards.

WG 7

In the area of Image Processing and Interchange (WG 7), the work of the subcommittee focuses on both standardizing technical terminology related to image processing and facilitating the development of various user community-defined profiles of the Image Interchange Facility (IIF) group of standards. These community-specific profiles support the unique requirements of various national governments and international coalitions that require specialized image processing and interchange frameworks to carry out their missions (e.g., the U.S. Department of Defense, the NATO Alliance, and the Treaty on Open Skies, under the auspices of the Organization for Security and Cooperation in Europe (OSCE)).

WG 8

Standardized descriptions and representations of the environment – where environment includes ocean, terrain, atmosphere, space, and their cross-integrated content – are essential to many of today's business applications. The applications span a broad range and include modeling, simulation, analysis, training, education, route planning, disaster management, urban development, smart cities, and games. The environmental data may be based on a combination of natural, man-made, and fictitious content. WG 8 provides standards that facilitate the representation, expression, and interchange of environments, from simple to highly integrated and complex content.

WG 9

The work of WG 9 includes standardisation of Mixed and Augmented Reality (MAR) continuum concepts including a reference model. For example, Head-mounted displays (HMDs) capable of running MAR (Mixed and Augmented Reality) apps are now available at lower prices than before, and their quality is improving. In order to experience MAR apps even more easily, the use of high-performance smartphones is also increasing.

WG 10

WG 10 seeks to work on projects that cross traditional SC 24 areas such as visualization (mainly WG 6), environmental data representation (carried out in WG 8), and VR/AR (WG 9 and JWG 12). It also draws on the work of WG 11 for Metaverse user experiences.

WG 11

In 2024, the following standard was published:

ISO/IEC 5927:2024 Computer graphics, image processing and environmental data representation — Augmented and virtual reality safety — Guidance on safe immersion, set up and usage

WG 11 considers health and safety impacts of AR/MR/VR usage including safe immersion periods across areas such as the built environment, military simulation, first responder training and manufacturing and utilities. This aims to provide surety to stakeholders that the technology can be used safely across sectors and by consumers.

JWG12

Many industries are increasingly advancing digital information transformation and systems integration with virtual worlds. Recent developments in VR, AR, MR, and metaverse-related information processing technologies are fundamental to this trend of integrating the real and virtual worlds. Standardized VR/AR/MR-based ICT integration technologies are essential for enabling metaverse service applications across various industry sectors, including education and training, health and safety, entertainment, manufacturing, retail, travel, and more.

JWG 16

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 develops and maintains 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, standards for consumption of data derived from and associated with product models, standards for interfaces from SC 4 product definition standards and establish liaison with other standards activities working on information models for 3D visualization.

3.0 Achievements and benefits

ISO/IEC JTC 1/SC 24 deliverables to date can support the following United Nations Sustainable Development Goals (SDG) because of their potential value in contributing to the development of the metaverse and MAR applications in smart cities:

GOAL 8: Decent Work and Economic Growth

GOAL 9: Industry, Innovation and Infrastructure

GOAL 10: Reduced Inequalities

GOAL 11: Sustainable Cities and Communities

GOAL 16: Peace and Justice Strong Institutions

The following key standards have been published in the last 12 months:

- ISO/IEC TR 16088 Information technology — Computer graphics, image processing and environmental representation — Constructs for visual positioning systems in mixed and augmented reality (MAR)
- ISO/IEC 18026:2025 Information technology – Spatial Reference Model (SRM)
- ISO/IEC 18042-5:2024 Computer graphics, image processing and environmental data representation – Spatial Reference Model (SRM) language bindings – Part 5: C++
- ISO/IEC 19777-3:2025 Computer graphics, image processing and environmental data representation – Extensible 3D (X3D) language bindings – Part 3: C
- ISO/IEC 19777-4:2025 Computer graphics, image processing and environmental data representation – Extensible 3D (X3D) language bindings – Part 4: C++
- ISO/IEC 19777-5:2025 Computer graphics, image processing and environmental data representation – Extensible 3D (X3D) language bindings – Part 5: C#

4.0 Participation and cooperation/collaboration

ISO/IEC JTC 1/SC 24 are co-operating with a number of internal and external liaison entities to collaboratively develop standards needed by industry. Examples of these collaborative activities are:

- Co-operative liaison arrangements with SEDRIS and Web3D organisations
- Participation in ISO/IEC JTC 1/CG 1 (Strategic Coordination Group on Data Management and Governance) for collaboration on data and metaverse governance
- Participation in the strategic coordination group on Metaverse (ISO/IEC JTC 1/CG 2), established to coordinate Metaverse work in JTC 1.
- WG 10 Collaboration with other JTC1 groups and also other organizations (IEC TC 100) has been achieved through participation in JSEG-15 (Metaverse) meetings.
- WG 10 will work with JTC 1 SCs: 29, 35, 38, 41, 42, IEC TC 100 and other groups as required to progress potential work items for metaverse, big data, digital twin, and smart cities.
- JWG 12 was established in collaboration with JTC 1/SC 36 and JTC 1/SC 29 for standards to work on VR/AR/MR based ICT integration in Learning, Education and Training.
- JWG 16 was established in collaboration with ISO/TC 184/SC 4 and ISO/TC 171/SC 2 for developing standards on formats for visualization and other derived forms of product data.

The full list of formal liaisons is available at:

[ISO/IEC JTC 1/SC 24 - Computer graphics, image processing and environmental data representation](#)

5.0 Objectives and strategies to achieve them

WG 6

Working Group 6's efforts on Computer Graphics and Virtual Reality are broad and impactful, centered on the X3D and HAnim standards. The Extensible 3D (X3D) Graphics International Standard (IS) is the open, royalty-free International Standard for publishing, viewing, printing, and archiving interactive 3D models on the Web. The Humanoid Animation (HAnim) International Standard includes full-fidelity representations for skeleton and skin of the human body, with multiple mechanisms for motion animation of articulated humans. Careful technical evolution with dependable backwards/forward compatibility have led to continuous interoperability of interactive 3D models since the advent of the original Virtual Reality Modeling Language (VRML) standard in 1997. The X3D and HAnim standards offer many opportunities for shared publication, demonstration and presentation by a variety of diverse ISO/IEC standards.

WG 7

The objectives of WG 7 (Image Processing and Interchange) include fostering the development of abstract standards for image processing frameworks, standardization of image processing terminology, and providing technical support to user communities intent on profiling various portions of the existing Image Interchange Facility (IIF) suite of standards. The working group encourages these efforts through dialog with member nations, various standards bodies, and

representatives of various communities of interest who formally register profiles of parts of the IIF standards with the subcommittee (e.g., the NATO Imagery Working Group Chairperson and staff, the U.S. National Imagery Transmission Format Standard (NITFS) Technical Board (NTB) Chairperson, the Chair of the Informal Working Group on Sensors for the Open Skies Consultative Commission (OSCC), etc.).

WG 8

The objectives of WG 8 is to provide standards that facilitate the unambiguous representation and exchange of real and fictitious world environments, which is an essential part of such application domains as Digital Twin, modeling and simulation for training or analysis, and Metaverse.

Directly and through its members, WG 8 engages in standardization and community activities that aim to improve and elevate the common understanding and communication of environmental data. This includes activities of all other SC 24 WGs (especially WG 6, WG 9, WG 10, and JWG 12), as well as external standards bodies such as SISO, TC 211, OGC, Web 3D Consortium, IEEE Spatial Web WG, and others.

WG 9

The objective of WG 9 is standardization regarding the Mixed and Augmented Reality continuum of topics such as: Reference architectures; Functional specifications; Scene/data representation and interchange formats; Remote mixed reality data exchange (cloud/server/client); Interaction; Multimodal input and output; Registration/calibration process; Device specifications; and System performance and evaluation processes.

The strategies to achieve them are as follows:

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, consumer groups and academia.

Seek collaborative activities (Web3D, VRM consortium, W3C, OGC, Khronos group, MSF) and collaboration with other SDO's (e.g., IEEE), academic associations (e.g., ACM), and industry fora (e.g., MWC, AWExpo).

WG 10

The main thrust for WG 10 is work on the emerging Metaverse. A multi-part standard is planned with the first part in progress as a DIS. Two Ad Hoc groups have been established to manage five more parts. Further opportunities for standardization have been identified including Big Data Visualization (potential multi-part standard), Environmental Information Visualization, and Visual Protection in the Metaverse. Three NWIPs will be developed to progress these new work items.

Additional work in areas related to smart cities and digital twins has been discussed but is immature.

WG 11

WG 11 is focussed on progressing the development of *ISO/IEC AWI 23595: User Experience Design in AR/MR/VR* with intended circulation and approval of the draft standard by WG 11 members and wider dissemination to SC 24.

The *PWI 23554 Privacy Policy Requirements in Modelling and Simulation Environments* was put on hold pending resolution of whether this work would be subsumed into JTC1 initiatives. Now that this is not happening, this PWI is to be progressed with coordination on privacy by liaison with :

- ISO/IEC JTC 1/SC 44 Consumer privacy
- ISO/IEC JTC 1/SC 27 WG 5 Privacy Policy Requirements

JWG 12

The objectives of JWG 12 are to analyze use cases, to provide guidelines for developing use cases, and to develop standards related to VR/AR/MR based ICT integration systems. JWG 12 collaborates with other standards groups including ISO/TC 159, ISO/TC 215, ISO/TC 232, IEC/TC 62, and IEC/TC 100.

JWG 12 develops standards related to VR/AR/MR and integration technologies across various industry domains, including learning, education, and training. VR/AR/MR technologies can be categorized by application and analysis should be conducted to provide appropriate procedures and guidelines for these applications. Several projects are currently in progress, including: Information modelling for VR/AR/MR based education and training systems, VR/AR/MR systems integration terminology and concepts, reference model, virtual environments model, and virtual human model, and use case classification for VR/AR/MR systems are being developed as new work items. In addition, use cases and design guidelines for VR/AR/MR based learning, education and training are being developed. Further domains where VR/AR/MR technologies can be applied are also under study.

JWG 16

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 develops and maintains 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, standards for consumption of data derived from and associated with product models, standards for interfaces from SC 4 product definition standards and establish liaison with other standards activities working on information models for 3D visualization. JWG 16 is currently drafting a technical report which will collect the current status of its standards and perspectives of new projects related to industrial visualization requirements. A call for contributions was initiated by SC 4 and SC 24 to collect use cases, ideas, new topics by P-members and organizations in liaison.

6.0 Factors affecting completion and adoption of the work program

The lack of national participating experts in NP ballots has led to problems in NP approval. More active participation by P-member nations is requested.

WG 10 and WG 11 have identified several prospective work items that would benefit from broader collaboration and active contributions to support the development of PWIs and NWIPs. Two Ad Hoc Groups were established to progress the multi-part Metaverse series. These are planned to evolve to Joint Working Groups as the work progresses.

7.0 Structure, current projects, and publications

Organizational structure of SC 24

Subgroups	Title	Terms of Reference
CAG	Chair's Advisory Group	To advise the Committee Chair on current, key issues
WG 6	Computer graphics and virtual reality	- Standardization of computer graphics functional specifications for application programming 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.
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.
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.
WG 9	Reference architectures and functional specifications	- Reference architectures and functional specifications - Scene/data representation and interchange formats - Remote mixed reality data exchange (cloud/server/client) - Interaction - Multimodal input and output - Registration/calibration processes - Device specifications - System performance and evaluation processes.
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.
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.
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.
JWG 16 (TC 184/SC 4)	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, etc. - 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 groups working on information models for 3D visualization
Ad Hoc Group 1	Communications and outreach	• Preparation of content for new public SC 24 Website to include - o Website organization, management, and maintenance procedures - o Maintenance of the ISO Register of Items - o Work with SC 24 officers to provide information on new projects / publications etc • Promotion of events • Develop Communication releases, publicly accessible web content (e.g., wiki pages, LinkedIn, ISO and IEC promotional channels) and other external documents • Collect newsworthy and useful information from members that is valuable for wider dissemination • Consider Succession Planning activities • Collaborate with SC 24 CAG on creating long-term strategies • Liaison with external bodies working in areas related to SC 24 activities, including representation at JTC 1 AG 2 Communications group
Ad Hoc Group 2	Framework, architecture, and use cases for the metaverse	• Define a framework and architecture for the metaverse • Analyze a series of use cases to showcase metaverse applications and define guidelines for developing metaverse use cases

Ad Hoc Group 3	Reference model, information model, and governance for the metaverse	• Define a reference model for developing metaverse application systems • Define an information model for metaverse applications to generate, access, and exchange metaverse information and data • Define a governance reference for the metaverse on how to manage systems, data, and users
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ISO/IEC JTC 1/SC 24 would like to highlight the following new work;

WG 6

Current WG6 efforts involves corresponding updates of multiple standards, where the intention is to first update the standards for file encodings (e.g., XML, ClassicVRML, Compressed Binary, JSON, RDF/OWL Turtle) and then update the standards for programming language bindings (e.g., ECMAScript, Java, Python, and possibly Pascal). Continuing work for the HAnim standard includes exploring capabilities for facial animation, clothing, internal organs, and motion capture (MOCAP).

WG 7

Work on a new standard for Computer Vision Terminology has begun within WG 7. The goal of this standardization effort is to improve understanding and clarity within the field of Computer Vision (CV) generally and to support international business activities related to computer vision technologies.

WG 9

Spatio-Temporal Mixed and Augmented Reality Experience Description (MAR-ED) for Interactive Playback (Dooyoung Kim and Woontack Woo, Korea)

WG 10

The Metaverse work is highest priority. While Part 1 will be carried out mainly within WG 10, further parts will require collaboration with establishment of firstly Ad Hoc Groups and then Joint Working Groups. These new planned parts are: 24931-2 (Framework), -3 (Use Cases), -4 (Reference Model), -5 (Information Model), and -6 (Governance). Two Ad Hoc Groups have been established: Ad Hoc Group 2 is responsible for Parts 2 and 3, while Ad Hoc Group 3 oversees Parts 4, 5, and 6. As new proposals (NPs) are developed, these Ad Hoc Groups will transition into Joint Working Groups (JWGs). However, it should be noted that these Ad Hoc Groups are under SC 24 and not WG 10.

A further work item was proposed at the 2024 SC 24 Plenary and further discussed at the 2025 Plenary: 3D Visual Protection for the Metaverse. This provides a means of protecting visual information such as people, objects, backgrounds, and text displayed in virtual spaces by transforming or replacing them with different faces, objects, backgrounds, or text to prevent unauthorized access and interpretation.

Current projects of SC 24

SC 24 currently has 16 active work items plus a number of PWI under development, see below:

Reference	Document title
ISO/IEC CD 19775-2	Extensible 3D (X3D) — Part 2: Scene access interface (SAI)
ISO/IEC PWI 22626	Motion capture
ISO/IEC AWI 24940	Computer vision --Terminology
ISO/IEC CD 18024-5	SEDRIS language bindings — Part 5: C ++
ISO/IEC DIS 21134	Benchmarking of integrated indoor localization and tracking methods using dead reckoning
ISO/IEC CD 18038-2	Sensor representation in mixed and augmented reality — Part 2: Information model
ISO/IEC CD 20538	Human Information Data Model for 3D Virtual Smart Cities
ISO/IEC PWI 23546	Environmental Data Visualization
ISO/IEC PWI 23457	Big Data Visualization
ISO/IEC DIS 24931-1	Computer graphics, image processing and environmental data representation — Metaverse Part 1: Concepts, definitions and terminology
ISO/IEC PWI 24931-2	Part 2: Framework and Architecture
ISO/IEC PWI 24931-3	Part 3: Use Cases
ISO/IEC PWI 24931-4	Part 4: Reference Model
ISO/IEC PWI 24931-5	Part 5: Information Model
ISO/IEC PWI 24931-6	Part 6: Metaverse Governance
ISO/IEC PWI 23595	User Experience Design in VR/AR/MR
ISO/IEC PWI 23554	Privacy Policy Requirements in Modelling and Simulation Environments
ISO/IEC FDIS 9234	Information modelling for VR/AR/MR based education and training systems
ISO/IEC CD 23620-1	VR/AR/MR systems integration Part 1: Terminology and concepts
ISO/IEC PWI 23620-2	Part 2: Reference model
ISO/IEC PWI 23620-3	Part 3: Virtual environment model
ISO/IEC PWI 23620-4	Part 4: Virtual human model
ISO/IEC AWI 25767	Bare-face representation of XR glasses wearers for communication
ISO/IEC AWI 25768	Augmented Mutual Space Representation for Remote Collaboration
ISO/IEC AWI 25689	Use case classification for VR/AR/MR systems integration
ISO/IEC PWI 26591	Visual Security in the Metaverse
ISO/IEC PWI 26592	Information technology — Use cases and design guidelines for

	VR/AR/MR based learning, education and training
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For JWG 16, ISO/PWI TR 25272 Automation systems and integration - Industrial data - Industrial requirements for product data visualization and perspectives

Additional work has been proposed at the recent SC 24 Plenary meeting.

The current work program of SC 24 is listed at:

<https://www.iso.org/committee/45252/x/catalogue/p/0/u/1/w/0/d/0>

Publications of SC 24 standards

There are 96 standards that have been developed in SC 24 (2025-07-21).

From these, some historical and representative standards of SC 24 are listed below:

Standard No.	Title	Importance
ISO/IEC 19775-1	Extensible 3D (X3D) – Part 1: Architecture and base components	Provide 3D data architecture, data model, and data format for the metaverse
ISO/IEC 19775-2	Extensible 3D (X3D) – Part 2: Scene access interface (SAI)	Provide SAI for X3D data model and file format so that X3D scenes can be accessed using APIs
ISO/IEC 19774-1	Humanoid Animation (HAnim) – Part 1: Architecture	Provide humanoid data structure that can be used to generate and represent humanoid avatars with X3D file format
ISO/IEC 19774-2	Humanoid Animation (HAnim) – Part 2: Motion data animation	Provide humanoid animation methods and interchangeable data formats using motion capture data
ISO/IEC 12087-5:2025	Basic Image Interchange Format (BIIF)	Defines the basic image interchange format (BIIF) for use with Image Interchange Facility (IIF) standards and rules for profiling the BIIF standard for use within communities of interest; second edition supports the inclusion of a temporal dimension for imagery data and cleans up errata from the previous edition
ISO/IEC 18023-1	SEDRIS – Part 1: Functional specification	Provide the concepts for the representation and interchange of environmental data that can be used to generate environment data organization for the metaverse
ISO/IEC 18025	Environmental Data Coding Specification (EDCS)	Provide unambiguous objects and an environmental data dictionary that can be used to model environments
ISO/IEC 18026	Spatial Reference Model (SRM)	Provide spatial positioning and related information processing that allows precise and unambiguous specification for spatial information
ISO/IEC 18039	Mixed and Augmented Reality (MAR) reference model	Provide key concepts of mixed and augmented reality and a generalized system architecture for a reference model for MAR applications
ISO/IEC	Sensor representation in MAR	Provide a framework and

18038		information reference model for representing sensor-based 3D mixed-reality worlds that can be used for MAR applications using sensors
ISO/IEC 18040	Live actor and entity (LAE) representation in MAR	Provide a reference model and base components for representing and controlling LAE2 in an MAR scene that can be used to represent live actor and entities in 3D virtual environments
ISO/IEC 18520	Benchmarking of vision-based spatial registration and tracking methods for mixed and augmented reality (MAR)	Provide a reference framework for the benchmarking of vision-based spatial registration and tracking (vSRT) methods for MAR applications
ISO/IEC 5147	Guidelines for representation and visualization of smart cities	Provide concepts and guidelines for the representation and visualization of smart cities that can be used for the metaverse
ISO/IEC 9973	Procedures for registration of items	Specifies the procedures for preparing, maintaining and publishing the SC 24 International Register of Items for any standard whose classes of items are applicable to this register, including computer graphics concepts, data structures used by relevant standards, spatial and environmental concepts, and profiles of relevant standards.
ISO/TS 23301:2023	STEP geometry visualization services	This document defines a set of metadata to support the audit trail of the transformation of a geometry definition, while it is distributed and shared in supply-chains, to ensure the traceability of geometric model data. It also defines a set of web services based on the utilisation of these metadata.

Live information can be obtained from:

<https://www.iso.org/committee/45252/x/catalogue/p/0/u/1/w/0/d/0>