

# ISO/IEC JTC 1 및 SC 24의 메타버스 표준화 동향 및 이슈

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# Summary

1. JTC 1 TTR (Technical Trend Report) for the metaverse (worked in JTC 1/AG 2 on JTC 1 Emerging Technology and Innovation, JETI)
  - Introduction
  - Terms and definitions
  - Concepts
  - JTC 1 technologies for the metaverse
  - JTC 1 standards and standardization for the metaverse
  - Relevant standardization activities of other groups
  - The direction of standards development for the metaverse
  - Annexes
2. JTC 1/CG 2 strategic coordination group on the metaverse
3. JTC 1/SC 24 standards development for the metaverse
  - Progress of work in ISO/IEC JTC 1/SC 24
  - Call for participation

# JTC 1 and JTC 1/SC 24

## 1. JTC 1 scope

- Information technology

## 2. JTC 1/SC 24 scope

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

# JTC 1 TTR - Introduction

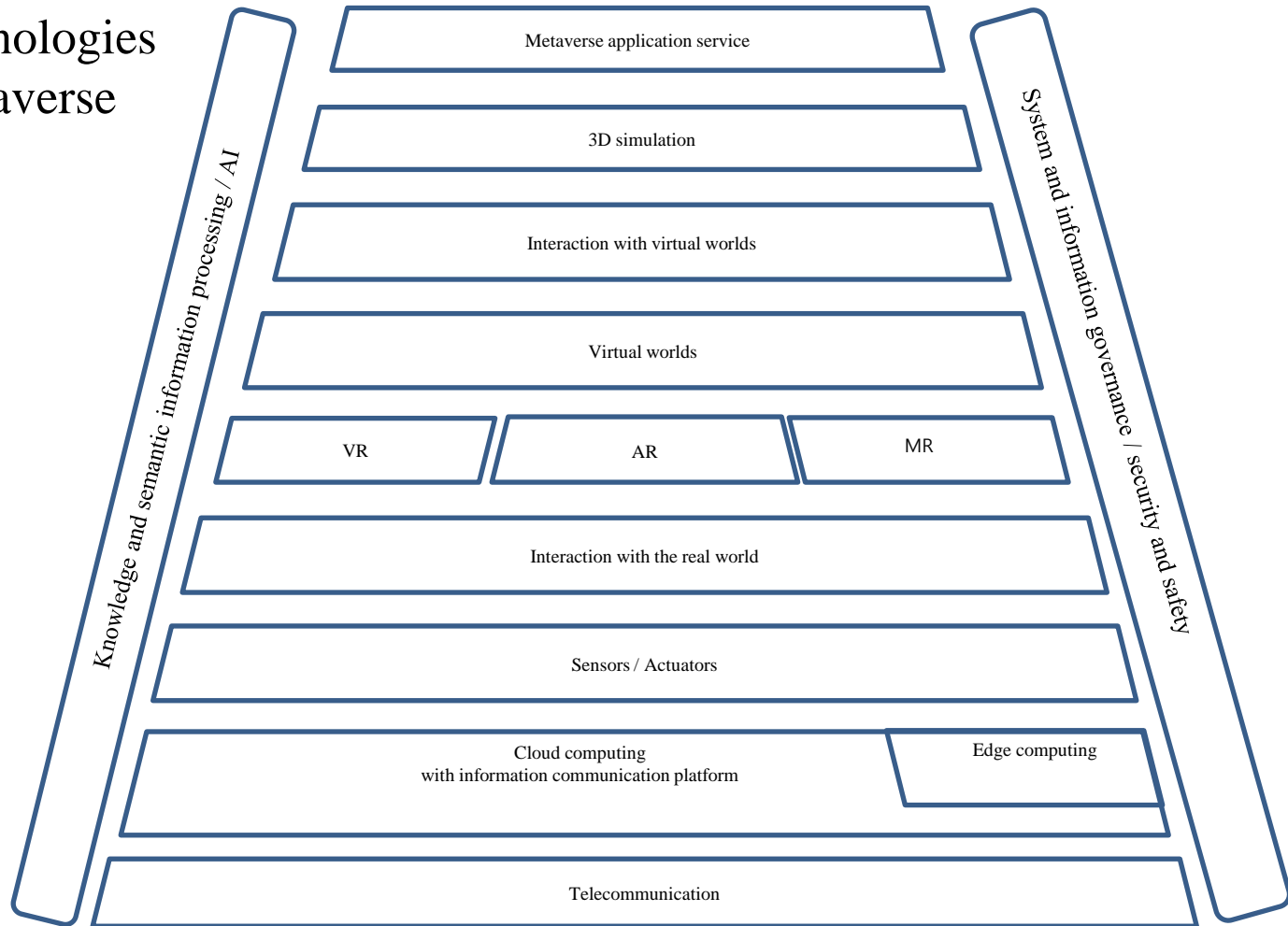
- The Metaverse TTR report focuses on
  - JTC 1 technologies necessary for implementing the metaverse
    - Standardized virtual world and avatar information processing
    - VR/AR/MR, 3D simulation, user interface, safety and security, cloud and edge computing, artificial intelligence, communication platform, etc.
  - Integration of JTC 1 technologies into virtual worlds for enhancing all areas of human life (industry, commerce, social activities, education, etc.)
  - JTC 1 standards and projects
  - New standards development for the metaverse
  - JTC 1 strategies for the metaverse

# JTC 1 TTR - Terms and Definitions

- Technical terms that are relevant to all JTC 1 technologies for metaverse implementations
  - Metaverse concepts, the metaverse and VR/AR/MR, information communication, cloud/edge computing, sensors, interaction with real and virtual worlds, 3D simulation, AI, big data processing, safety and security, knowledge and semantic information processing, etc.
- Unique terms to distinguish between real and virtual worlds
  - Because real and virtual objects co-exist in metaverse environments, terms should be defined uniquely so as to avoid confusion
  - This includes terms to distinguish between a human and their avatar representation, a real and virtual object for an entity, and the real and virtual environment in the metaverse

# JTC 1 TTR - Concepts (1)

- JTC 1 technologies for the metaverse



# JTC 1 TTR - Concepts (2)

- Metaverse service areas



(a) education



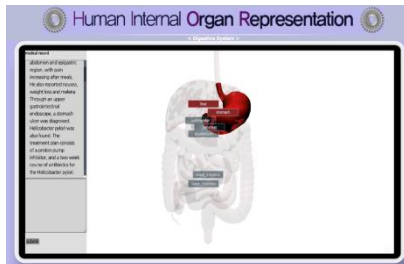
(b) training



(c) event



(d) training



(e) medicine



(f) health and safety



(g) safety



(h) travel

# Concepts (3)

- Requirements and relevant standards
  - Virtual world representation, visualization, and information processing: ISO/IEC 14772, 19775-1, 19775-2, 18023, 18025, 18026, ISO/IEC TS 5147
  - 3D avatar representation, visualization, and information processing: ISO/IEC 19774-1, 19774-2
  - VR/AR/MR based information processing: ISO/IEC 18038, 18039, 18040, 180520, 14496-16, 14496-25, 23090-5
  - Knowledge and semantic information processing: ISO/IEC 18023, 18025, 19775-1, 19775-2, 19788, 4932, 22602, 23126, ISO/IEC TR 20748
  - Cyber safety, security, identity, and authority: ISO/IEC 5927, 27001, 15408
  - ICT integration with diverse industry sectors: ISO/IEC CD 9234
  - Governance guidelines for management of the metaverse



# JTC 1 TTR

## JTC 1 Technologies for the Metaverse (1)

- Virtual world
  - Creation, representation, interchange, interaction, connection, and integration of virtual environments
- Humanoid avatar
  - Human representation, interchange, interaction, communication, and integration with virtual environments
- VR/AR/MR based information processing
  - Integration of real-world information into virtual worlds with creation, manipulation, and representation
  - Storage, interchange, and common use of virtual world information
- Knowledge and semantic information processing
  - Knowledge and semantics for metaverse services are incorporated into virtual worlds

# JTC 1 TTR

## JTC 1 Technologies for the Metaverse (2)

- Cyber security, identity, and authorization
  - Security should be specified at several levels: for an individual, organization, nation, system, distribution, and data
- AI information processing for the metaverse
  - Large volume of big data including that for real and virtual worlds, human avatar and sensor data
- Metaverse platform and communication
  - Infrastructure for communication between the real and virtual worlds, and between avatars

# JTC 1 TTR

## JTC 1 Technologies for the Metaverse (3)

- ICT integration technologies with industry areas
  - Real-world representation
  - Visualization and simulation
  - AI and big data processing
  - Information exchange and interaction with virtual worlds
  - Information exchange and interaction with the real world
  - Application content creation and manipulation
  - Application information modeling

# JTC 1 TTR

## JTC 1 Standards and Standardization for the Metaverse

- JTC 1/SC 6 Telecommunications and information exchange between systems
- JTC 1/SC 7 Software and systems engineering
- JTC 1/SC 24 Computer graphics, image processing and environmental data representation
- JTC 1/SC 27 Information security, cybersecurity and privacy protection
- JTC 1/SC 29 Coding of audio, picture, multimedia and hypermedia information
- JTC 1/SC 32 Data management and interchange
- JTC 1/SC 35 User interfaces
- JTC 1/SC 36 Information technology for learning, education and training
- JTC 1/SC 37 Biometry
- JTC 1/SC 38 Cloud computing and distributed platforms
- JTC 1/SC 39 Sustainability, IT and data centres
- JTC 1/SC 40 IT service management and IT governance
- JTC 1/SC 41 Internet of Things and digital twin
- JTC 1/SC 42 Artificial intelligence
- JTC 1/WG 11 Smart cities

# JTC 1 TTR

## Relevant Standardization Activities of Other Groups

- ISO/IEC JSEG 15
- IEC TC 100
- EC (European Commission)
- IEEE
- ITU-T Focus Group on Metaverse (FG-MV)
- ISO/TC 307
- Joint Development Foundation's Alliance for OpenUSD
- SEDRIS Organization
- The Khronos Group
- The World Wide Web Consortium (W3C)
- Web3D Consortium

# JTC 1 TTR

## The Direction of Standards Development for the Metaverse (1)

- Provide standards for metaverse information definition and information
- Provide standards for software design and development, and their guidelines
- Provide standards for VR/AR/MR-based user interfaces
- Provide VR/AR/MR-based ICT integration standards
- Provide standards for AI applied big data processing
- Provide standards for safe and secure metaverse applications
- Provide standards for cloud and edge computing
- Provide standards for communications networks
- Provide governance standards on safety and security for the metaverse

# JTC 1 TTR

## The Direction of Standards Development for the Metaverse (2)

- Metaverse governance in JTC 1
  - Develop JTC 1 standards to provide guidance for metaverse governance
    - For systems, governance should include safety and security related to platforms and virtual worlds
    - For users, governance should include safety and security related to human health, both mental and physical, taking into account sensor devices and computer systems, abnormal content, or insufficient performance of systems
    - For data, governance should be conducted so that data is secure, sharable and interoperable through systems
  - Collaboration between various subcommittees is required because governance should encompass the complete range of JTC 1 technologies

# JTC 1 TTR

## Annex A Usage and Areas of ISO/IEC JTC 1 and ISO/TC 307 Standards for the Metaverse

- A.1 JTC 1/SC 24 Standards
- A.2 JTC 1/SC 27 Standards
- A.3 JTC 1/SC 29 Standards
- A.4 JTC 1/SC 38 Standards
- A.5 JTC 1/WG 11 Standards
- A.6 ISO/TC 307 Standards



# JTC 1/CG 2

## Strategic Coordination Group on Metaverse

### Terms of Reference

- Develop an integrated view of the external environment in the Metaverse domain.
- Strategically review the opportunities and potential projects within the domain to address gaps and stakeholder needs.
- Advise JTC 1 on action the Strategic Coordination Group and JTC 1 should take to maximize success for JTC 1 in this domain.
- Facilitate communication, coordination, and information among member entities.
- Identify cases of coordination needed among member entities on new or existing projects.
- Explore opportunities with the constituent entities to communicate and promote the domain work through webinars and other activities and deliverables and facilitate its implementation.
- Provide a report to JTC 1 at each JTC 1 Plenary. This report shall cover progress, plans, and recommendations to JTC 1.

# JTC 1/CG 2

## Strategic Coordination Group on Metaverse

- Report to JTC 1/CG 2 on Metaverse by SC 41 (October 17, 2024)
  - Various standardization organizations addressing Metaverse. Some main actors – overview
  - Some insights regarding what these organizations have done so far
  - About the standardization landscape for Metaverse
  - Correlation between Metaverse, CitiVerse and Local Digital Twins
  - Metaverse and the JWG between JTC1 and SyC Smart Cities on UDT and CIM
  - Some words about Spatial Web

# Metaverse Project and Work Items in JTC 1/SC 24

- ISO/IEC CD 24931-1 Metaverse Part 1: Concepts, definitions and terminology
- ISO/IEC PWI
  - ISO/IEC 24931-2 Metaverse Part 2: Framework and architecture
  - ISO/IEC 24931-3 Metaverse Part 3: Use cases
  - ISO/IEC 24931-4 Metaverse Part 4: Reference model
  - ISO/IEC 24931-5 Metaverse Part 5: Information model
  - ISO/IEC 24931-6 Metaverse Part 6: Governance
  - Visual Security in the metaverse

# ISO/IEC CD 24931-1 Metaverse

## Part 1: Concepts, Definitions, and Terminology

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# ISO/IEC PWI 24931-2

## Metaverse - Part 2: Framework and Architecture

- Scope: Define the framework and architecture for the metaverse. The following topics focused on system architectures will be included:
  - Metaverse platforms in relation to cloud /edge computing
  - Sensors and actuators for virtual worlds
  - Real world interactions
  - VR/AR/MR based virtual worlds
  - Avatar representation in virtual worlds
  - Avatar communication in virtual worlds, as well as with the real world
  - Virtual world interactions
  - Virtual world simulation
  - Security and safety in virtual worlds
  - Knowledge and semantic information processing
  - System and information governance

# ISO/IEC PWI 24931-3 Metaverse

## Part 3: Use Cases

- Metaverse use case areas analysis
  - Economic, cultural, and social activities
  - Education and training, health and safety, manufacturing and production, travel, event, shopping, entertainment, etc.
- Metaverse use case types
- Metaverse use case components
- Metaverse use case design guidelines
- Metaverse use case examples

# ISO/IEC PWI 24931-4 Metaverse

## Part 4: Reference Model

- Scope: Define a reference model for developing metaverse application systems. This specifies a reference data model that can be used for generating data structures necessary for exchanging metaverse data between systems or platforms. The following topics focused on data models will be included:
  - Metaverse platforms in relation to cloud /edge computing
  - Sensors and actuators for virtual worlds
  - Real world interactions
  - VR/AR/MR based virtual worlds
  - Avatar representation in virtual worlds
  - Avatar communication in virtual worlds, as well as with the real world
  - Virtual world interactions
  - Virtual world simulation
  - Security and safety in virtual worlds
  - Knowledge and semantic information processing
  - System and information governance

# ISO/IEC PWI 24931-5 Metaverse

## Part 5: Information Model

- Scope: Define an information model for metaverse service applications. This specifies an information model and interfaces necessary for providing metaverse services. Semantic and service information and design guidance for application services will be included. The following topics focusing on information modelling and interfaces will be included.
  - Metaverse platforms in relation to cloud /edge computing
  - Sensors and actuators for virtual worlds
  - Real world interactions
  - VR/AR/MR based virtual worlds
  - Avatar representation in virtual worlds
  - Avatar communication in virtual worlds, as well as with the real world
  - Virtual world interactions
  - Virtual world simulation
  - Security and safety in virtual worlds
  - Knowledge and semantic information processing
  - System and information governance



# ISO/IEC PWI 24931-6 Metaverse

## Part 6: Governance

- Scope: Define a reference for governance in managing systems, data, and users for the metaverse. The following topics will be included.
  - Governance guidance for metaverse systems administration
  - Governance guidance for metaverse data administration
  - Governance guidance for metaverse user administration

# PWI

## Visual Security in the Metaverse

- Scope: Standard data model for mapping 2D images to 3D avatar faces using deepfake technology, and enabling secure storage and exchange. The following topics will be included:
  - Metaverse visual security terminology
  - Metaverse visual security concepts
  - Face transformation
  - Object replacement
  - Background alteration
  - Text obfuscation

# ISO/IEC JTC 1 N 17118

## Invitation for Collaborative Work on the Metaverse with ISO/IEC JTC 1/SC 24

- ISO/IEC JTC 1 entities that are interested in participating in the development of these PWIs are requested to send an email to the ISO/IEC JTC 1/SC 24 Committee Manager (Jean.Stride@bsigroup.com)
- Identify the topic of interest, provide an overview and, if applicable, nominate a co-convenor and experts to work with the SC 24 Officers
- The deadline for responses is 1st January 2025
- Ad Hoc Groups will then be created in SC 24 to progress the PWIs and prepare initial WDs to accompany the NWI ballots
- Once the NP ballots have been approved, it is anticipated that JWG's may be created, and that the Ad Hoc Group co-convenors will become co-convenors for the JWG's

# Future Plans for the Metaverse in JTC 1/SC 24

- Creation of Ad Hoc Groups for the metaverse projects (PWI 24931-2, 24031-3, 24931-4, 24931-5, 24931-6, and Visual security) in collaboration with other SCs or TCs (2025)
- Ad Hoc Group meetings (2025-2026)
- Preparation of NPs and initial WDs for the PWI projects (2025-2026)
- If NPs are accepted, Ad Hoc Groups will be disbanded and JVGs will be created in their place (2026)