Committee Document

IEC/ISO JSEG 15/WS 1 N1

Metaverse — Vocabulary

Metaverse — Vocabulaire

Edition 0.3
2024-08

Reference number
IEC/ISO JSEG 15/WS 1 N1(en)

COPYRIGHT PROTECTED DOCUMENT

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives)

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents) or the IEC list of patent declarations received (see https://patents.iec.ch).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

This document was prepared by ISO/IEC JSEG 15, *Metaverse*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

Introduction

This document presents terms and definitions for concepts relevant to the Metaverse.

Specifically, the terminology presented in this document:

— serve as a sound basis in the understanding of Metaverse;

— guide new developments in the field by underpinning mutual understanding; and

— serve as a quick and handy reference for those newly introduced to this field.

Metaverse — Vocabulary

1 Scope

This document provides a concept system and a standard set of terminology related to the Metaverse, from basic concepts to those of the Metaverse ecosystem.

The scope of the vocabulary provided in this document corresponds to that of ISO/IEC JSEG 15.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org

3.1 Metaverse core concepts

3.1.1
metaverse
virtual world (3.1.18) experienced through *immersive* (3.1.14) technologies

3.1.2
artificial intelligence
AI
capacity of computers or other machines to exhibit or simulate intelligent behavior

[SOURCE: IEEE 7010™-2020]

3.1.3
assistive technology
piece of equipment, product system, hardware, software or service that is used to enable, maintain or improve functional capabilities of individuals with disabilities

[SOURCE: ITU-T F.791 (08/2018)]

3.1.4
cloud computing
paradigm for enabling network access to a scalable and elastic pool of shareable physical or virtual resources with self-service provisioning and administration on-demand

[SOURCE: ISO/IEC 17788:2014, 3.2.5]

3.1.5
decentralized identifier
DID
identifier in the format of the W3C Decentralized Identifier

[SOURCE: W3C did-core]

3.1.6
digital human
realistic virtual human representations created using advanced simulation technology

3.1.7
digital twin
digital representation of an object of interest

Note 1 to entry: A digital twin may require different capabilities (e.g., synchronization, real-time support) according to the specific domain of application.

[SOURCE: ITU-T Y.4600 (08/2022)]

3.1.8
distributed computing
model of computing in which a set of nodes coordinates its activities by means of digital messages passed between the nodes

[SOURCE: ISO/IECTR 23188:2020, 3.1.1]

3.1.9
distributed ledger
a *ledger* (3.1.17) that is shared across a set of DLT nodes and synchronized between the DLT nodes using a consensus mechanism

[SOURCE: ISO 22739:2024, 3.22]

3.1.10
digital asset
asset that exists only in digital form or which is the digital representation of another asset

[SOURCE: ISO 24165-1:2021, 3.9]

3.1.11
digital identity
information used by information systems to represent an external agent, a person, organization, application, or device

3.1.12
edge computing
distributed computing (3.1.8) in which processing and storage takes place at or near the edge, where the nearness is defined by the system's requirements

[SOURCE: ISO/IECTR 23188:2020, 3.1.3]

3.1.13
edge device
device that provides an entry point into enterprise or service provider core networks

EXAMPLE Gateways, routers, switches, multiplexers, and a variety of other access devices.

[SOURCE: W3C wot-architecture]

3.1.14
immersive
creating the illusion of being inside a computer-generated scene

[SOURCE: ISO/IEC19775-1:2023]

3.1.15
Internet of Things
system of entities (including cyber-physical devices, information resources, and people) that exchange information and interact with the physical world by sensing, processing information, and actuating

[SOURCE: IEEE 2413™-2019, modified — dropped article.]

3.1.16
interoperability
ability of two or more systems or applications to exchange information and to mutually use the information that has been exchanged

[SOURCE: ISO/IEC 17788:2014, 3.1.5]

3.1.17
ledger
information store that keeps records of transactions that are intended to be final, definitive and immutable

[SOURCE: ISO 22739:2024, 3.43]

3.1.18
virtual world
simulated environment that can be accessed by multiple users through an online interface

Note 1 to entry: The simulated environments are often interactive.

Note 2 to entry: The physical world in which people live, and the related characteristics, will be referred to as the "real world" to differentiate it from a virtual world.

[SOURCE: ISO/IEC 27032:2012, 4.51]

3.1.19
virtual office
3-D virtual scene replicating office space of an organization, providing users with an *immersive* (3.1.14) experience

3.1.20
user-generated content
UGC
content created by users within the *metaverse* (3.1.1)

Note 1 to entry: UGC is often facilitated by simplified editing tools.

3.2 Metaverse use cases

3.2.1
industrial metaverse
metaverse (3.1.1) that integrates virtual and physical realities to create a sophisticated digital industrial ecosystem, enhancing real-world processes through virtual simulations and strengthening the entire industrial and value chain with increased intelligence, collaboration, openness, service orientation, and interconnectivity

3.2.2
financial metaverse
metaverse (3.1.1) enabling a new type of financial business where the physical world and the mirrored digital world are symbiotic

3.2.3
education metaverse
metaverse (3.1.1) enabling a multi-sensory *immersive* (3.1.14) classroom connecting virtual and reality, enabling knowledge acquisition, participation, and creation

3.2.4
healthcare metaverse
metaverse (3.1.1) that enables the digital, intelligent and accurate medical information platform that breaks space-time restrictions and technical barriers of the original medical system

3.2.5
eCommerce metaverse
metaverse (3.1.1) that enables marketing towards users, creating personalized, emotional and social marketing scenes through metaverse technology and content

3.2.6
game metaverse
metaverse (3.1.1) that enables the evolution of gaming that embodies four characteristics: immersion, accessibility, accessibility and extensibility

3.2.7
social metaverse
metaverse (3.1.1) that creates a holographic virtual reality that integrates the advantages of online and offline social networking, using *AR* (3.3.2), *VR* (3.3.4), *XR* (3.3.1) and other technologies

3.3 XR concepts

3.3.1
extended reality
XR
environments experienced through human-machine sensory interactions commonly composed of real world and virtual elements

Note 1 to entry: Extended reality covers *virtual reality* (3.3.4), *augmented reality* (3.3.2) and *mixed reality* (3.3.3) environments.

3.3.2
augmented reality
AR
interactive experience of a real-world environment whereby the objects that reside in the real world are augmented by computer-generated perceptual information

[SOURCE: ISO/IEC 18038:2020, 3.1]

3.3.3
mixed reality
MR
display continuum in which both real and virtual images are combined in some way and in some proportion

Note 1 to entry: Augmented reality and virtual reality are considered to be on the mixed reality continuum.

[SOURCE: ISO/IECTR 23843:2020, 3.4, modified — added Note 1 to entry.]

3.3.4
virtual reality
VR
artificial environment presented in the computer

[SOURCE: ISO/IECTR 18121:2015, 3.6, modified — dropped article]

3.3.5
mixed reality system
system that uses a mixture of representations of physical world data and virtual world data as its presentation medium

[SOURCE: ISO/IEC 18039:2019, 3.1.13]

3.3.6
mixed and augmented reality
MAR
integration of real and virtual worlds including *mixed reality* (3.3.3) and *augmented reality* (3.3.2)

Note 1 to entry: MAR is often used interchangeably with MR.

[SOURCE: ISO/IEC 18038:2020]

3.4 Extended metaverse concepts

3.4.1
C-Meta
low-carbon social metaverse under the Web 3.0 architecture, aiming to build a new green and energy-saving digital economy

3.5 Governance

3.5.1
stakeholder
role, position, individual, organization, or classes thereof, having an interest, right, share, or claim, in an entity of interest

EXAMPLE End users, operators, acquirers, owners, suppliers, architects, developers, builders, maintainers, regulators, taxpayers, certifying agencies, and markets.

[SOURCE: ISO/IEC/IEEE42010:2022, 3.17, modified — dropped article]

3.5.2
stakeholder perspective
way of thinking about an entity of interest, especially as it relates to concerns

[SOURCE: ISO/IEC/IEEE42010:2022, 3.18, modified — The original example has been removed.]

4 Definition of Metaverse

4.1 General

The definition of a “metaverse” has long been subject of controversy.

4.2 Approach

In order to define any concept, it is necessary to determine the essential characteristics of the concept, where additions or subtractions to these characteristics will no longer define the concept.

4.3 Background

The word “metaverse” originated from the science fiction *Snow Crash* written by Neal Stephenson in 1992 [23].

In popular culture, the term “metaverse” is commonly used as a generalized entity beyond the Internet, as a massively multi-player virtual world experienced through immersive technologies with comprehensive sensory integration through human computer interfaces.

The group has considered a few popular definitions of the “metaverse”, including:

— From [20]: “universal, immersive virtual world that is facilitated by virtual reality (VR) and augmented reality (AR)”

— From [21]: persistent and immersive simulated world that is experienced in the first person by large groups of simultaneous users who share a strong sense of mutual presence

— From [22]: an infinite and persistent set of computer-generated virtual worlds that may be accessed via some human computer interface

4.4 Considerations

WS 1 has considered various definitions, common perspectives and expectations on the term “metaverse” and has come to the following conclusions based on consensus.

Essential characteristics of the “metaverse” include:

— **virtual**, as in the items in the experience is virtual

— **immersive** where it is experienced through human computer interaction

Common characteristics expected by popular culture include:

— **massively multi-user** where there can be many simultaneous users

— **interconnection** of virtual world systems

— **interoperability** between users across virtual world systems

— **persistent** where actions and events in the virtual world persists after a user leaves

— **real-time** where user actions are performed in real-time

The resulting consensus arrived at this definition for “metaverse”:

> metaverse: virtual world experienced through immersive technologies

Annex A
(informative)

Abbreviated terms

AGI	artificial general intelligence
AI	artificial intelligence
API	application programming interface
AR	augmented reality
DLT	distributed ledger technology
IoT	Internet of Things
ML	machine learning
OMF	Open Modeling Foundation
OWL	Web Ontology Language
RDF	Resource Description Framework
UDT	Urban Digital Twin
VR	virtual reality
WoT	Web of Things
W3C	World Wide Web Consortium
XR	collective reference to both AR and VR

Bibliography

[1] ISO/IEC 17788:2014[1)], *Information technology — Cloud computing — Overview and vocabulary*

[2] ISO/IEC 18038:2020, *Information technology — Computer graphics, image processing and environmental representation — Sensor representation in mixed and augmented reality*

[3] ISO/IEC 18039:2019, *Information technology — Computer graphics, image processing and environmental data representation — Mixed and augmented reality (MAR) reference model*

[4] ISO/IEC TR 18121:2015, *Information technology — Learning, education and training — Virtual experiment framework*

[5] ISO/IEC 19775-1:2023, *Computer graphics, image processing and environmental data representation — Extensible 3D (X3D) — Part 1: Architecture and base components*

[6] ISO 22739:2024, *Blockchain and distributed ledger technologies — Vocabulary*

[7] ISO/IEC TR 23188:2020, *Information technology — Cloud computing — Edge computing landscape*

[8] ISO/IEC TR 23843:2020, *Information technology for learning, education and training — Catalogue model for virtual, augmented and mixed reality content*

[9] ISO 24165-1:2021, *Digital token identifier (DTI) — Registration, assignment and structure — Part 1: Method for registration and assignment*

[10] ISO/IEC 27032:2012[2)], *Information technology — Security techniques — Guidelines for cybersecurity*

[11] ISO/IEC/IEEE 42010:2022, *Software, systems and enterprise — Architecture description*

[12] ITU FGMV-O-235, ITU-T. *Draft Technical Specification ITU FGMV — Vocabulary for metaverse*.

[13] IEEE 2413™-2019, *IEEE Standard for an Architectural Framework for the Internet of Things (IoT)*. Updated May 1, 2020. Approved. Institute of Electrical and Electronics Engineers. Available from: https://ieeexplore.ieee.org/document/9032420.

[14] IEEE 7010™-2020, *IEEE Recommended Practice for Assessing the Impact of Autonomous and Intelligent Systems on Human Well-Being*. Approved. Institute of Electrical and Electronics Engineers. Available from: https://ieeexplore.ieee.org/document/9084219.

[15] ITU-T F.791 (08/2018), *Accessibility terms and definitions*. Version 2. Published. International Telecommunication Union. Available from: https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=13661&lang=en.

[16] ITU-T Y.4600 (08/2022), *Requirements and capabilities of a digital twin system for smart cities*. Version 1. Published. International Telecommunication Union. Available from: https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=15073&lang=en.

[17] W3C did-core, *Decentralized Identifiers (DIDs) v1.0*. Recommendation. World Wide Web Consortium. Available from: https://www.w3.org/TR/did-core/.

[18] W3C did-spec-registries, *Decentralized Identifier Extensions*. World Wide Web Consortium. Available from: https://www.w3.org/TR/did-spec-registries/.

1) Cancelled and replaced by ISO/IEC 22123-1:2023.

2) Cancelled and replaced by ISO/IEC 27032:2023.

[19] W3C wot-architecture, *Web of Things (WoT) Architecture*. Candidate recommendation. World Wide Web Consortium. Available from: https://www.w3.org/TR/wot-architecture/.

[20] ISO/IEC JTC 1. *JTC 1 Standards and Standardization for the Metaverse* [website]. 2023. Available from: https://jtc1info.org/jtc-1-standards-and-standardization-for-the-metaverse/. [viewed: September 5, 2024].

[21] ROSENBERG L.. *Metaverse 101: defining the key components* [website]. VentureBeat. 2022. Available from: https://venturebeat.com/business/metaverse-101-defining-the-key-components/. [viewed: September 5, 2024].

[22] STOTHARD P., RYAN P., & KURATA T.. *Mining Metaverse Taxonomy (NOT YET PUBLISHED)*. n.p.: 2024.

[23] NEAL STEPHENSON. *Snow crash*. Bantam Books. Available from: http://openlibrary.org/books/OL14813122M/Snow_crash.

Index

Price based on 9 pages