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FGMV-33

Glossary for metaverse

Working Group 1: General

Technical Specification ITU FGMV-33

Glossary for metaverse

Summary

This Technical Specification provides a set of core terms and associated definitions to reflect the basic concepts used in the metaverse. The document aims to encourage a mutual and consistent understanding of, and a coherent approach to, activities relating to the metaverse, and the use of harmonized terminology. It includes terms and definitions for the metaverse, which have been widely used in the FG-MV deliverables, including terms already defined in relevant standards development organizations (SDOs). This document is intended to be relevant for: a) people engaged in metaverse activities; b) people involved in metaverse activities at ISO, IEC, ITU-T, and other international standards bodies; and c) developers of national or sector-specific standards, guides, procedures, and codes of practice relating to the metaverse.

Keywords

metaverse; glossary; term; definition.

Note

This is an informative ITU-T publication. Mandatory provisions, such as those found in ITU-T Recommendations, are outside the scope of this publication. This publication should only be referenced bibliographically in ITU-T Recommendations.

Change Log

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Additional information and materials relating to this Technical Specification can be found at: https://www.itu.int/go/fgmv. If you would like to provide any additional information, please contact Cristina Bueti at tsbfgmv@itu.int.

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1 Scope

This Technical Specification provides a set of core terms and associated definitions to reflect the basic concepts used in the metaverse. The document aims to encourage a mutual and consistent understanding of, and a coherent approach to, activities relating to the metaverse, and the use of harmonized terminology. It includes terms and definitions for the metaverse which have been widely used in the FG-MV deliverables, including terms already defined in relevant standards development organizations (SDOs). This document is intended to be relevant for: a) people engaged in metaverse activities; b) people involved in metaverse activities at ISO, IEC, ITU-T, and other international standards bodies; and c) developers of national or sector-specific standards, guides, procedures, and codes of practice relating to the metaverse.

2 References

None.

3 Definitions

This Technical Specification uses the following terms defined elsewhere:

3.1 Terms defined elsewhere

3.1.1 Access control [b-ITU-T X.1252]: The prevention of unauthorized use of a resource, including the prevention of use of a resource in an unauthorized manner.

3.1.2 Accessibility [b-ITU-T F.791]: Degree to which a product, device, service or environment (virtual or real) is available to as many people as possible.

3.1.3 Accessibility feature [b-ITU-T F.791]: Any additional content component that is intended to assist people hindered in their ability to perceive an aspect of the main content.

Note: It is suggested that “an” is replaced with “any” in the above definition.

3.1.4 Application [b-ITU-T Y.101]: A structured set of capabilities, which provide value-added functionality supported by one or more services.

3.1.5 Artificial intelligence (AI) [b-ITU-T M.3080]: Computerized system that uses cognition to understand information and solve problems.

NOTE 1 – ISO/IEC 22989:2022 defines AI as research and development of mechanisms and applications of AI systems (Note 1 to entry: Research and development can take place across any number of fields such as computer science, data science, humanities, mathematics and natural sciences).

NOTE 2 – In computer science AI research is defined as the study of “intelligent agents”: any device that perceives its environment and takes actions to achieve its goals.

NOTE 3 – This includes pattern recognition, the application of machine learning and related techniques.

NOTE 4 – Artificial-intelligence is the whole idea and concept of machines being able to carry out tasks in a way that mimics human intelligence and would be considered “smart”.

3.1.6 Asset [b-ITU-T X.1400]: Representation of value.

3.1.7 Assistive technology [b-ITU-T F.791]: Piece of equipment, product system, hardware, software or service that is used to enable, maintain or improve functional capabilities of individuals with disabilities.

3.1.8 Augmented reality (AR) [b-ITU-T J.301]: A type of mixed reality where graphical elements are integrated into the real world in order to enhance user experience and enrich information.

3.1.9 Authentication [b-ISO/IEC 18014-2]: Provision of assurance of the claimed identity of an entity.

3.1.10 Big data [ITU-T L.1390]: A term that describes the large volume of data – both structured and unstructured – that inundates a business on a day-to-day basis. Big data can be analysed for insights that lead to better decisions and strategic business moves.

3.1.11 Bin [b-MPEG-VCM]: The symbols that makes up a binary string including 0 and 1.

3.1.12 Bitstream [b-MPEG-VCM]: The binary data stream formed by encoding the original data.

3.1.13 Blockchain [b-ITU-T X.1400]: A type of distributed ledger which is composed of digitally recorded data arranged as a successively growing chain of blocks with each block cryptographically linked and hardened against tampering and revision.

NOTE 1: Metaverse is defined as an integrative ecosystem of virtual worlds offering immersive experiences to users that modify pre-existing and create new value from economic, environmental, social and cultural perspectives [b-FGMV-20].

NOTE 2: Urban is defined as of, relating to, characteristic of, or constituting a city [b-Webster/urban].

NOTE 3: CitiVerse offers unique value relating to cities and city community concerns from administrative and political perspectives.

3.1.14 Braille [b-ISO/IEC 17351]: Tactile reading and writing system composed of Braille cells. These are raised dots that can be read with the fingers, especially by people who are blind or who have low vision.

3.1.15 Characteristic [b-ISO 1087]: Abstraction of a property.

EXAMPLE: 'Having a cable for connecting with a computer' as a characteristic of the concept 'cord mouse'.

Note 1 to entry: Characteristics are used for describing concepts.

3.1.16 Circularity [ITU-T L.1070 (11/2023)]: Designing out waste and pollution, keeping products and materials in use, and regenerating natural systems.

3.1.17 City [b-ITU-T Y.4900]: An urban geographical area with one (or several) local government and planning authorities.

3.1.18 Closed loop [b-ITU-T Y.3115]: A type of control mechanism in which the outputs and behaviour of a system are monitored and analysed, and the behaviour of the system is adjusted so that improvements may be achieved towards definable goals.

3.1.19 Cloud computing [b-ITU-T Y.3500]: 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.

NOTE – Examples of resources include servers, operating systems, networks, software, applications, and storage equipment.

3.1.20 Concept [b-ISO 1087]: Unit of knowledge created by a unique combination of characteristics.

Note 1 to entry: Concepts are not necessarily bound to natural languages. They are, however, influenced by the social or cultural background which often leads to different categorizations.

Note 2 to entry: This refers to the concept of 'concept' as used and designated by the term "concept" in terminology work. It is a very different concept from that designated by other domains such as industrial automation or marketing.

3.1.21 Confidentiality [b-ITU-T X.800]: The property that information is not made available or disclosed to unauthorized individuals, entities, or processes.

3.1.22 Data [b-ITU-T FG-DPM0.1]: Representation of facts of objective reality in a formalized manner. Example: Data can be signs and symbols, and can be in analogue form, digital form or both.

NOTE – Data can be used for communication, interpretation or processing by human beings or automatic means.

3.1.23 Database [b-ISO/IEC 2382:2015, 2121413]: collection of data organized according to a conceptual structure describing the characteristics of these data and the relationships among their corresponding entities, supporting one or more application areas.

3.1.24 Data integrity[b-ITU-T X.800]: The property that data has not been altered or destroyed in an unauthorized manner.

3.1.25 Data interoperability [b-ITU-T Y.4563]: Ability of two or more systems or components to exchange data and to use the data that has been exchanged.

3.1.26 Decentralized application [b-ITU-T X.1400]: Application that runs in a distributed and decentralized computing environment.

3.1.27 Decentralized identifier (DID)[b-ITU-T X.1403]: A globally unique identifier that does not require a centralized registration authority because it is registered with distributed ledger technology (DLT) or other form of decentralized systems.

3.1.28 Decentralized system [b-ITU-T X.1400]: Distributed system wherein control is distributed among the persons or organizations participating in the operation of system.

3.1.29 Definition [b-ISO 1087]: Representation of a concept by an expression that describes it and differentiates it from related concepts.

3.1.30 Device [ITU-T Y.4000]: With regard to the Internet of things, this is a piece of equipment with the mandatory capabilities of communication and the optional capabilities of sensing, actuation, date capture, data storage and data processing.

3.1.31 Digital human [b-ITU-T F.748.15]: Computer application that integrates the technologies of computer graphics, computer vision, intelligent speech and natural language processing. It can be used for digital content generation and human-computer interaction to help improve content production efficiency and user experience.

3.1.32 Digital Signage (DS) [b-ITU-T H.780]**:** A system that sends information, advertising and other messages to electronic devices (e.g., displays, speakers) in accordance with the time of day and the location of the display, or the actions of audience. Contents and their relevant information, such as display schedules, are delivered over networks.

3.1.33 Digital transformation [b-ITU-T Y.4906]: A process during which, by advanced applications of ICTs in sectors' business activities such as R&D production and services, the sectors' business activities are optimized, reconstructed and integrated, and their development modes are disruptively reformed and innovated. The digital transformation is vitally useful for sectors to optimize resource configuration, improve operational efficiency and innovation capability, and hence realize sectors' sustainable development.

3.1.34 Digital twin [b-ITU-T Y.4600]: Digital representation of an object of interest.

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

3.1.35 Digital twin network [b-ITU-T Y.3090]: Virtual representation of a physical network. It is useful for analysing, diagnosing, emulating and controlling the physical network based on data, model

and interface, to achieve the real-time interactive mapping between the physical network and virtual twin network.

3.1.36 Distributed ledger [b-ITU-T X.1400]: A type of ledger that is shared, replicated, and synchronized in a distributed and decentralized manner.

3.1.37 Distributed ledger technology (DLT) [b-ITU-T X.1400]: Technology that enables the operation and use of distributed ledgers.

3.1.38 Diverse users [b-ISO/IEC 71]: Individuals with differing abilities and characteristics or accessibility needs.

3.1.39 Easy-to-understand language [b-ISO/IEC 23859]: Any language variety which enhances comprehensibility. Note 1 to entry: Easy-to-understand language includes plain language, easy language and any intermediate variety. These varieties share many recommendations, but the extent of comprehensibility is different as they address different user needs.

3.1.40 End point: End user [ITU-T Y.1910] or physical data terminal for metaverse services.

3.1.41 Entity [b-ITU-T X.1252]: Something that has separate and distinct existence and that can be identified in a context.

3.1.42 Environmental sustainability [b-ITU FGMV-49]: Responsibility to conserve natural resources and protect the global ecosystems including earth well-being and individual's health and wellbeing now and in the future.

3.1.43 Extended reality (XR) [b-ITU-T P.1320]: An environment containing real or virtual components or a combination thereof, where the variable X serves as a placeholder for any form of new environment (e.g., augmented, assisted, mixed, virtual or diminished reality).

3.1.44 Extra-metaverse [b-ITU-T FGMV-24]: Area of activity located outside the metaverse, either in the digital realm, the physical realm or through a network connecting both realms.

NOTE 1: Realm is defined broadly as the area of activity [b-Collins/realm] to include the virtual world and the physical world.

NOTE 2: The "digital realm" is the virtual world or "online", which is defined as connected to, served by, or available through a system and especially a computer or telecommunications system (such as the Internet) [b-Webster/online].

3.1.45 Feature [b-MPEG-VCM]: A tensor data that includes channel, width and height in three dimensions.

3.1.46 First order effect [ITU-T L.1480]: Direct environmental effect associated with the physical existence of an ICT solution, i.e., the raw materials acquisition, production, use and end-of-life treatment stages, and generic processes supporting those including the use of energy and transportation.

NOTE 1 – First order effects include GHG and other emissions, e-waste, use of hazardous substances and use of scarce, non-renewable resources.

NOTE 2 – First order effects are sometimes referred to as environmental footprints.

NOTE 3 – This definition has been amended from [ITU-T L.1410].

3.1.47 Greenhouse gases (GHGs) [ITU-T L.1410]: For the purposes of this methodology, GHGs are the seven gases listed in the Kyoto Protocol:

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Hydrofluorocarbons (HFCs)

- Perfluorocarbons (PFCs)
- Sulphur hexafluoride (SF_6)
- Nitrogen trifluoride (NF_3).

3.1.48 Higher order effect [ITU-T L.1480]: The indirect effect (including rebound effects) other than first and second effects occurring through changes in consumption patterns, lifestyles and value systems.

3.1.49 Home avatar [b-ITU-T FGMV-19]: The avatar which exists within original metaverse platform, remaining customizable for its corresponding entity. This primary version of an avatar in the metaverse resides exclusively within a specific metaverse platform or avatar service.

NOTE – The entity includes users, IoT devices, robots, digital humans, AI and system components.

3.1.50 Human-driven 3D digital human [b- ITU FGMV-38]: A 3D digital human, which is driven by a human to represent a series of actions by technical means in 3D manner.

3.1.51 ICT goods: [ITU-T L.1410] Tangible goods deriving from or making use of technologies devoted to or concerned with:

- The acquisition, storage, manipulation (including transformation), management, movement, control, display, switching, interchange, transmission or reception of a diversity of data;
- The development and use of the hardware, software, and procedures associated with this delivery; and
  The representation, transfer, interpretation, and processing of data among persons, places, and machines, noting that the meaning assigned to the data is preserved during these operations.

3.1.52 ICT Infrastructure (facility): [b-ITU-T L.1302] Equipment that supports the ICT equipment, e.g., power delivery components and cooling system components

3.1.53 Identity [b-ITU-T Y.2720]: Information about an entity that is sufficient to identify that entity in a particular context.

3.1.54 IMT-2020 [b-ITU-R M.2083-0]: Systems, system components, and related aspects that support to provide far more enhanced capabilities than those described in [b-ITU-R M.1645].

NOTE – [b-ITU-R M.1645] defines the framework and overall objectives of the future development of IMT-2000 and systems beyond IMT-2000 for the radio access network.

3.1.55 IMT-2030 [b-ITU-R M.2516-0]: IMT systems for 2030 and beyond. The development of IMT-2030 and beyond calls for a thorough reconsideration of several types of interaction. The roles of modularity and complementarity of new technological solutions become increasingly important in the development of increasingly complex systems. The use of data and algorithms such as artificial intelligence (AI) will play an important role, and technological complementarities are required to ensure that the technology innovations complement one another.

3.1.56 Inclusion [b-ITU-T G.9959]: Process of adding a new node to a domain in a way so that the node can communicate with other nodes in the domain and filter out traffic from other domains.

3.1.57 Inclusive development [b-UN SDGs]: Leaving no one behind.

3.1.58 Industrial Internet [b-ITU-T Y.2623]: A kind of industrial application ecology, characterized by convergence of the Internet and the new generation information and communication technologies (ICTs) with industrial systems, which serves as the key comprehensive information infrastructure for industrial intelligent development.

3.1.59 Industrial metaverse (IMV) [b- ITU FGMV-41]: Subcategory of metaverse for industry, which virtually represents physical industry worlds and is used for industrial activities including industrial design, manufacturing, service, and management.

NOTE 1 – There are two types of IMV, both of which include avatars and virtual objects. One type is realized by the IMV based on a digital twin enabling integration of virtual and physical worlds. The other type is realized that a digital twin does not integrate the physical and the virtual worlds.

NOTE 2 – The nature of the relationship between the physical world and IMV is one of mutual dependence, of one-way influence or of no links.

3.1.60 Internet of things (IoT) [b-ITU-T Y.4000]: A global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies.

NOTE 1 – Through the exploitation of identification, data capture, processing and communication capabilities, the IoT makes full use of things to offer services to all kinds of applications, whilst ensuring that security and privacy requirements are fulfilled.

NOTE 2 – In a broad perspective, the IoT can be perceived as a vision with technological and societal implications.

3.1.61 Interoperability [ITU-T Y.101]: Ability of two or more systems or applications to exchange information and mutually use the information that has been exchanged.

3.1.62 Intra-metaverse [b-ITU-T FGMV-24]: Area of activity located within the metaverse.

3.1.63 Ledger [b-ITU-T X.1400]: Information store that keeps final and definitive (immutable) records of transactions.

3.1.64 Life cycle: [b-ITU/T L.1061] Consecutive and interlinked stages of a product system, from raw material acquisition or generation from natural resources to final disposal.

3.1.65 Lorm [b-ITU-T FGMV-26]: A tactile alphabet where letters are spelled by tapping or stroking different parts of the hand. Lorm is not universal, each language establishes its conventions.

3.1.66 Metaverse [b-ITU-T FGMV-20]: An integrative ecosystem of virtual worlds offering immersive experiences to users, that modify pre-existing and create new value from economic, environmental, social and cultural perspectives.

NOTE – A metaverse can be virtual, augmented, representative of, or associated with the physical world.

3.1.67 Metaverse content provider: The content provider [ITU-T Y.1910] that owns or is licensed to sell avatar or other virtual objects that consist of metaverse.

Note – virtual objects may be visual in 2D or 3D form or may be not be visual objects such as computational modules to simulate the physical world situations.

3.1.68 Metaverse service provider: The service provider [ITU-T M.1400] is generally an operator that provides metaverse services to customers and other users either on a tariff or contract basis. A metaverse service provider can optionally operate a network.

NOTE – Typically, the metaverse service provider acquires or licenses metaverse contents from metaverse content providers and integrate them as metaverse service that is consumed by end-users.

3.1.69 Minimal interoperability [b-ITU-T Y.4602]: The minimal sufficient degree needed to meet a certain requirement for data sharing, use and re-use.

NOTE – This is an approach to build a set of modular mechanisms, including information models, across multiple domains, locations and events. The definition aligns with the definition of “interoperability” in [b-ITU-T Y.101]. （ITU-T FG-DPM D0.1）.

3.1.70 Mixed reality (MR) [b-ISO/IEC 18038]: Merging of real and virtual worlds to generate new environments where physical and synthetic objects co-exist and interact.

3.1.71 Net second order effect [ITU-T L.1480]: The resulting second order effect after accounting for emissions due to the first order effects of an ICT solution.

3.1.72 Netizen [b-Webster/netizen]: Active participant in the online community of the Internet.

3.1.73 Networked integration [b-ITU-T FGMV-24]: Metaverse users or non-users tied to at least one connection between the physical world and the digital world.

NOTE: This could occur if a user or non-user is connected to an object in the physical world that is also connected to the digital world (e.g., "things" connected to the Internet as with the Internet of Things (IoT)).

3.1.74 Network provider [ITU-T Y.1910]: The organization that maintains and operates the network components required for IPTV functionality.

NOTE 1 – A network provider can optionally also act as service provider.

NOTE 2 – Although considered as two separate entities, the service provider and the network provider can optionally be one organizational entity.

3.1.75 Nonfungible token (NFT) [b- ITU-T X.1400]: An entirely unique digital representation of an asset.

3.1.76 Object [b-ISO 1087]: Anything perceivable or conceivable.
Note 1 to entry: Objects can be material (e.g., 'engine', 'sheet of paper', 'diamond'), immaterial (e.g., 'conversion ratio', 'project plan') or imagined (e.g., 'unicorn', 'scientific hypothesis').

3.1.77 Off-world [b-ITU-T FGMV-24]: Relating to participant absence from a virtual online environment.
NOTE 1: Referring to a participant as being "off-world" assumes prior "in-world" presence in a persistent metaverse environment where users may enter and exit without interrupting the activities of other participants or the metaverse "world" itself.

NOTE 2: In-world is defined here as relating to presence in a virtual online environment [b-Collins/in-world], often using an avatar.

3.1.78 Phygital [b-Gaggioli]: A neologism that results from the synthesis of the terms ''physical'' and ''digital''—refers to a new concept of space that originates from the increasing convergence of the physical dimension and the virtual dimension.

3.1.79 Peri-metaverse [b-ITU-T FGMV-24]: Area of activity located within and outside the metaverse while staying either in the digital realm or in a merged digital-physical realm.

3.1.80 Person with age related disabilities [b-ITU-T F.791]: A person with cognitive or physical disabilities caused by the aging process. Examples are impaired eyesight, deafness in varying degrees, reduced mobility or cognitive abilities.

3.1.81 Person with specific needs [b-ITU-T F.791]: Includes persons with disabilities (PWD), persons who are not literate, those with learning disabilities, children, indigenous people, older persons with age-related disabilities, and anyone who has a temporary disability [FGMV-15]
3.1.82 Personhood in the metaverse [b-ITU-T FGMV-24]: Personal identity and existence in digital and digital-physical merged spaces.
NOTE 1: Based on a definition of personhood as the quality or condition of being a person; especially personal identity or selfhood [b-OED].
NOTE 2: There must be a one-to-one relationship between the user and their "personal identity and existence" as represented in the space. For example, a single user may not have multiple identities, nor can a single identity represent multiple users.
NOTE 3: User personal identity and existence can include but is not limited to avatars and other user assets.

NOTE 4: User personal identity and existence retains all human rights and responsibilities.

3.1.83 Personally identifiable information (PII) [b-ISO/IEC 29100]: Any information that (a) can be used to identify the PII principal to whom such information relates, or (b) is or might be directly or indirectly linked to a PII principal.

3.1.84 Physical data terminal device: The terminal device that is not end point and that input or output the physical world data for metaverse service.

NOTE 1 – A physical data terminal device may not be IoT devices [ITU-T Y.4401].

3.1.85 Physical object [b-ISO/IEC 18039]: object that exists in the real world.

3.1.86 Physical world [b-ISO/IEC 18039]: physical reality spatial organization of multiple physical objects.

3.1.87 Product [b-ISO/IEC 9241-11]: Item that is made or created by a person or machine.

3.1.88 Property [b-ISO 1087**]:** Feature of an object**.**
EXAMPLE 1: 'Being made of wood' as a property of a given 'table'.
EXAMPLE 2: 'Belonging to person A' as a property of a given 'pet'.
EXAMPLE 3: 'Having been formulated by Einstein' as a property of the equation 'E = mc2'.
EXAMPLE 4: 'Being compassionate' as a property of a given 'person'.
EXAMPLE 5: 'Having a given cable' as a property of a given 'computer mouse'.

Note 1 to entry: One or more objects can have the same property.

3.1.89 Rebound effect [ITU-T L.1480]: Increases in consumption due to environmental efficiency interventions that can occur through a price reduction or other mechanism including behavioural responses (i.e., an efficient product being cheaper or in other ways more convenient and hence being consumed to a greater extent).

3.1.90 Realms of metaverse participation [b-ITU-T FGMV-24]: Areas of activity related to user engagement in the metaverse.

3.1.91 Reconstructed feature [b-MPEG-VCM]**:**The feature tensor obtained by decoding the bitstream by the decoder.

3.1.92 RFID tag[b-ITU-T F.511]: Automatic identification and data capture (AIDC) media that can be queried by means of a suitably modulated inductive or radiating electromagnetic signal to transfer information to a centralized, tag-based information system.

3.1.93 Roaming avatar [ITU FGMV-19]: the avatar transitioning across various metaverse platforms from original metaverse platform, potentially undergoing alterations or transformations aligned with the destination platform's compatibility and features.

3.1.94 Smart sustainable city [b-ITU-T Y.4900]: A smart sustainable city is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social, environmental, as well as cultural aspects.
NOTE – City competitiveness refers to policies, institutions, strategies and processes that determine the city's sustainable productivity.

3.1.95 Security assurance [b-ITU-T X.1404]: Grounds for justified confidence that a claim about meeting security objectives has been or will be achieved.

3.1.96 Second order effect [ITU-T L.1480]: The indirect impact created by the use and application of ICTs which includes changes of environmental load due to the use of ICTs that could be positive or negative.

3.1.97 Sensor [b-ITU-T Y.4105] [b-ITU-T Y.4113]: A device that senses a physical condition or chemical compound and delivers an electronic signal proportional to the observed characteristic.

3.1.98 Service [b-ITU-T Y.2091]: A set of functions and facilities offered to a user by a provider. NOTE: [b-ISO/IEC 9241-11]: Means of delivering value for the customer by facilitating results the customer wants to achieve.

3.1.99 Specific needs [b-ITU-T F.791]: This replaces the use of the term 'special needs'. This term refers to a wide range of categories including women, children, youth, indigenous people, older persons with age-related disabilities, persons with illiteracy, as well as persons with disabilities (PWDs). See [b-ITU PP Res.175], [b-WTDC Res.58], [b-WTDC AP] and clause 6.39 (of [b-ITU-T F.791]).

3.1.100 Supervisory control and data acquisition (SCADA)[b-ITU-T Y.2071]: A computer system that monitors an industrial, infrastructure, or a facility-based control process.

3.1.101 System [b-ISO/IEC 9241-11]: Combination of interacting elements organized to achieve one or more stated purposes.

3.1.102 Tensor [b-tensor]: In mathematics, a tensor is an algebraic object that describes a multilinear relationship between sets of algebraic objects related to a vector space. Tensors may map between different objects such as vectors, scalars, and even other tensors.

3.1.103 Term [b-ISO 1087]: Designation that represents a general concept by linguistic means.

EXAMPLE: “laser printer”, “planet”, “pacemaker”, “chemical compound”, “¾ time”, “Influenza A virus”, “oil painting”.

3.1.104 Text-to-speech synthesis (TTS) [b-ITU-T P.10]: A TTS process generates a speech signal from text codes. It is usually composed of two parts: – A language-dependent text processing part (the high-level processing part), which generates from the character string (by reading rules, vocabulary and semantic analysis) a set of phonetic, prosodic, etc., parameters which are used by – an acoustical signal generating part, the synthesizer itself, which generates the audible speech.

Note 1 to entry: Terms may be partly or wholly verbal.

3.1.105 Thing [b-ITU-T Y.4000]: In the Internet of Things, an object of the physical world (physical things) or of the information world (virtual things), which is capable of being identified and integrated into the communication networks.

3.1.106 Token [b-ITU-T Y.4000]: A digital representation of value on a shared distributed ledger that is owned and secured using cryptography to ensure its authenticity and prevent modification or tampering without the owner's consent.

3.1.107 Trust [b-ITU-T X.1252] [b- ITU-T FG-DPM0.1]: The reliability and truth of information or the ability and disposition of an entity to act appropriately, within a specified context.

3.1.108 Trustworthiness [b- ISO/IEC 22989]: ability to meet stakeholder expectations in a verifiable way.

NOTE 1– Depending on the context or sector, and also on the specific product or service, data and technology used, different characteristics apply and need verification to ensure stakeholders’ expectations are met.

NOTE 2– Characteristics of trustworthiness include, for instance, reliability, availability, resilience, security, privacy, safety, accountability, transparency, integrity, authenticity, quality and usability.

NOTE 3– Trustworthiness is an attribute that can be applied to services, products, technology, data and information as well as, in the context of governance, to organizations.

3.1.109 Universal design [b-UNCRPD]: The design of products, environments, programmes and services to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design. "Universal design" shall not exclude assistive devices for particular groups of persons with disabilities where this is needed.

3.1.110 User confidence framework [b-ITU-T FGMV-06]: A framework created for the purpose of proposing a definition for confidence in the metaverse to promote a shared understanding; introducing the concept of an 'implied contract of confidence' to guide governance; and suggesting a set of 'confidence dimensions' to inform principles for user confidence.

3.1.111 User confidence in the metaverse [b-ITU-T FGMV-06]: A user's state of certainty and belief in the reliability of a metaverse platform or environment.
NOTE 1 – Confidence is generally defined as the quality or state of being certain [b-Webster].
NOTE 2 – Stressing the importance of the user's state of certainty and belief in the environment, this definition of user confidence seeks to provide a path to:
a. Considering user intent when developing principles that govern metaverse engagement.
b. Empowering individual users by addressing their expectations in immersive contexts.

3.1.112 User implied contract of confidence [b-ITU-T FGMV-06]: An agreement between the user and the platform provider implicit in the user's willingness to co-create with, and entrust resulting assets to, the platform. This is especially noteworthy when assets, including user "avatars" can represent the individuals' personhood.

3.1.113 User interface [b-ISO/IEC 9241-11]: All components of an interactive system (software or hardware) that provide information and/or controls for the user to accomplish specific tasks with the interactive system.
3.1.114 Virtual object [b-ITU-T FGMV-28]: A computer-generated entity that is designated for a virtual world.
NOTE – a virtual object may associate with a physical object, which becomes a digital twin.

3.1.115 Virtual reality (VR) [b-ITU-T P.1320]: An environment that is fully generated by digital means. To qualify as virtual reality, the virtual environment should differ from the local environment.

3.1.116 Virtual world [b-ISO/IEC 18039]: Virtual environment, spatial organization of multiple virtual objects, potentially including global behaviour.

3.1.117 Vocabulary [b-ISO 1087]**:** Terminological dictionary that contains designations and definitions from one or more domains or subjects.

Note 1 to entry: The vocabulary may be monolingual, bilingual, or multilingual.

3.1.118 Web 3.0 [b-ISO 5127:2017]: Following Web 2.0 which rather than simply connecting internet addresses and data in their formal form additionally does effect data linking through and in favour of their semantic content or meaning thus providing enriched and enlarged information answering requests.

3.2 Terms defined in this Technical Specification

This Technical Specification defines the following terms:

3.2.1 Avatar: Digital entity that can be used as a (visual) representation of the user inside the virtual environments.

3.2.2 Ecosystem: A system consisting of a set of interdependent components sharing the same environment and interacting with each other, which functions as a unit.

NOTE 1 – Ecosystem can be distributed, stable functioning, complex, structure, adaptive, open, socio-technical, and interrelated system, with properties of self-organization, scalability and sustainability.

3.2.3 Power metaverse: Subcategory of metaverse in the power industry.
NOTE 1 – Power metaverse creates a link between stakeholders, tangible assets (e.g., power meters, environmental sensors), and intangible assets (e.g., policies, regulations, and electricity trading modes) in the metaverse ecosystem of power industry, promoting sustainable and efficient utilization of energy resources.

3.2.4 Spatial computing: Interaction between humans and machines, wherein machines retain and manipulate referents to real objects and spaces.

NOTE 1 – With spatial computing, the interaction process between humans and machines is controlled by utilizing gestures, eye movement, and voice commands detected by sensors, rather than using keyboards and buttons.

NOTE 2 – Unlike traditional computing methods, spatial computing takes into account the spatial relationships and interactions between objects, environments, and users in a three-dimensional (3D) space.

NOTE 3 – Spatial computing involves the integration of various technologies such as augmented reality (AR), virtual reality (VR), mixed reality (MR), computer vision, IoT, AIGC, and other sensor-based technologies, to perceive and interact with the environment in real time.

NOTE 4 – In terms of applications and services, spatial computing has been applied in various sectors, including media, culture and tourism, industry, business, and collaborative offices.

4 Abbreviations and acronyms

This Technical Specification uses the following abbreviations and acronyms:

3D	Three-Dimensional
AI	Artificial Intelligence
AIGC	AI Generated Content
AR	Augmented Reality
DLT	Distributed Ledger Technology
DS	Digital Signage
IMV	Industrial metaverse
IoT	Internet of Things
MR	Mixed Reality
MV	Metaverse
NFT	Non-Fungible Token
TTS	xt-to-speech synthesis
XR	Extended Reality
VR	Virtual Reality

5 Conventions

None.

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