메타버스표준전문연구실 – 메타버스 국제표준기술 세미나 (2024.09.12, 과총회관)

Key outcomes of ITU FG-MV activities and future work

Shin-Gak KANG

Chair, ITU Focus Group on metaverse (FG-MV)

Vice-Chair, ITU-T Study Group 16

Chair, ITU-T SG16 / WP 1

12 September 2024

ITU Focus Group on metaverse (FG-MV)

Unanimously established by TSAG in December 2022;

- (ITU) 193 Member States as well as more than 900 companies, research institutes and International Organizations

FG: Open to non-ITU members;

Free of charge;

Physical meetings with remote participation & E-meetings

Diverse management team:

- Government, Industry, Academia, UN agencies
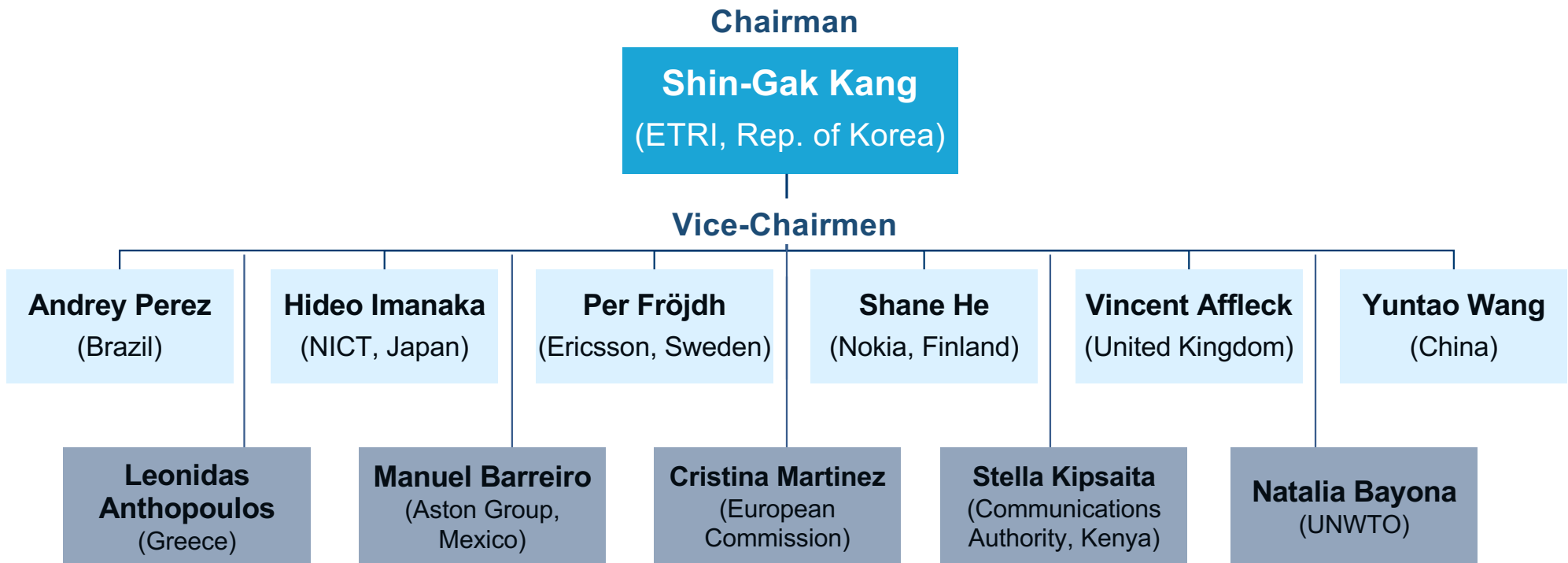- Africa, Asia, Europe, Americas

63 Work programs

including Technical Specifications & Reports

More than **500 experts involved in the FG-MV**

FG-MV Management Team

Chairman

Shin-Gak Kang
(ETRI, Rep. of Korea)

Vice-Chairmen

Andrey Perez
(Brazil)

Hideo Imanaka
(NICT, Japan)

Per Fröjdh
(Ericsson, Sweden)

Shane He
(Nokia, Finland)

Vincent Affleck
(United Kingdom)

Yuntao Wang
(China)

Leonidas Anthopoulos
(Greece)

Manuel Barreiro
(Aston Group, Mexico)

Cristina Martinez
(European Commission)

Stella Kipsaita
(Communications Authority, Kenya)

Natalia Bayona
(UNWTO)

FG-MV Structure

❖ A unique collaboration platform to shape an open, secure, and interoperable metaverse

❖ **9 WGs** (Working Groups) and **18 TGs** (Task Groups)

WORKING GROUP 1

General

WORKING GROUP 2

Applications & Services

WORKING GROUP 3

Architecture & Infrastructure

WORKING GROUP 4

Virtual/Real World Integration

WORKING GROUP 5

Interoperability

WORKING GROUP 6

Security, Data & PII Protection

WORKING GROUP 7

Economic, Regulatory & Competition Aspects

WORKING GROUP 8

Sustainability, Accessibility & Inclusion

WORKING GROUP 9

Collaboration

ITU FG-MV meetings **– held in different regions**

FG-MV Lifetime: December 2022 ~ June 2023 (about 18 months)

Regular FG-MV meetings: held 7 times

500+

Experts involved

1st FG-MV meeting: 8~9 March 2023, Riyadh, Saudi Arabia;

2nd FG-MV meeting: 4~6 July 2023, Shanghai, China;

3rd FG-MV meeting: 3~5 October 2023, Geneva, Switzerland;

4th FG-MV meeting: 4~7 December 2023, Geneva, Switzerland;

5th FG-MV meeting: 5-8 March 2024, Queretaro, Mexico;

6th FG-MV meeting: 30 April 2024, Virtual;

7th FG-MV meeting: 12-13 June 2024, Geneva, Switzerland.

155 WGs/TGs (e)-meetings

ITU FG-MV Work Programs & Deliverables

Total work programs (June 2024): 63

Deliverables approved: 52 **(including a definition of metaverse)**

- ❖ March ~ December 2023: **22**
- ❖ January ~ June 2024: **30**

Deliverables unfinished: 11

Allocation of FG-MV deliverables to ITU-T Study Groups by TSAG

- ❖ TSAG meeting in January 2024 (22 deliverables)
- ❖ TSAG meeting in August 2024 (30 deliverables)

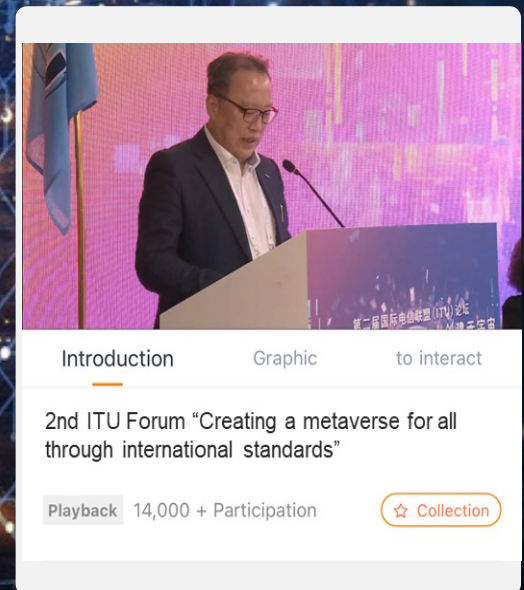# Diverse events on the metaverse with groundbreaking attendance

5 ITU Forums on metaverse

in Saudi Arabia, China, Tanzania, Mexico and Geneva

17,000+
Participants in attendance

2 Special Sessions of ITU FG-MV

in Arusha and Riga with call to actions

8 Webnars

Dedicated to the topic of metaverse on the Digital Transformation Dialogues

Introduction   Graphic   to interact

2nd ITU Forum "Creating a metaverse for all through international standards"

Playback   14,000 + Participation   ☆ Collection

UN Virtual Worlds Day

Harnessing the metaverse to advance the Sustainable Development Goals

14 June 2024
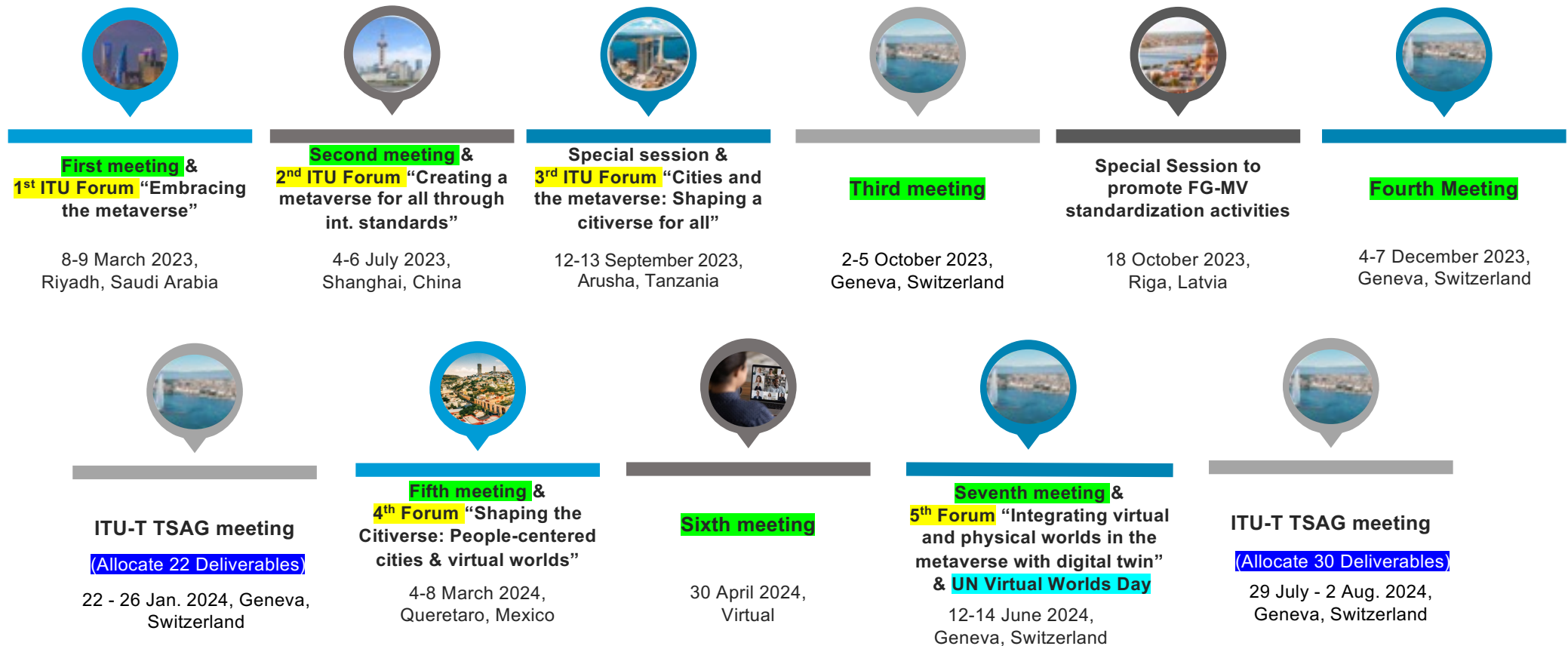**Geneva, Switzerland**

itu.int/metaverse/un-virtual-worlds-day

Journey of FG-MV and related events

First meeting &
1st ITU Forum "Embracing the metaverse"

8-9 March 2023,
Riyadh, Saudi Arabia

Second meeting &
2nd ITU Forum "Creating a metaverse for all through int. standards"

4-6 July 2023,
Shanghai, China

Special session &
3rd ITU Forum "Cities and the metaverse: Shaping a citiverse for all"

12-13 September 2023,
Arusha, Tanzania

Third meeting

2-5 October 2023,
Geneva, Switzerland

Special Session to promote FG-MV standardization activities

18 October 2023,
Riga, Latvia

Fourth Meeting

4-7 December 2023,
Geneva, Switzerland

ITU-T TSAG meeting

(Allocate 22 Deliverables)

22 - 26 Jan. 2024, Geneva, Switzerland

Fifth meeting &
4th Forum "Shaping the Citiverse: People-centered cities & virtual worlds"

4-8 March 2024,
Queretaro, Mexico

Sixth meeting

30 April 2024,
Virtual

Seventh meeting &
5th Forum "Integrating virtual and physical worlds in the metaverse with digital twin" & **UN Virtual Worlds Day**

12-14 June 2024,
Geneva, Switzerland

ITU-T TSAG meeting

(Allocate 30 Deliverables)

29 July - 2 Aug. 2024,
Geneva, Switzerland

FG-MV Definition of metaverse

The metaverse is…

"

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.

ITU Focus Group on metaverse
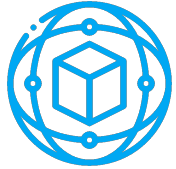
Working Group 1: General

Co-Chairs:
- Mr Leonidas ANTHOPOULOS (University of Thessaly, Greece)
- Ms Radia FUNNA (Build n Blaze)

Vice-Chair:
- Mr Younghwan CHOI (ETRI, Korea)

Terms of reference:

- Business ecosystem
- Collection of best practices, including a gap analysis
- Roadmap for setting technical standards
- Overall concepts, service model, related technologies of metaverse platforms and services
- Issues outside the scope of other WGs

3 Task Groups

- Terminology & definitions
- Implications for people in the metaverse
- Pre-standardization for the CitiVerse

WG1 deliverables (10)

Type	Title of deliverable	Timeline	TSAG Allocation
FGMV-01 (TR)	Exploring the metaverse: opportunities and challenges	July 2023	All SGs
FGMV-02 (TR)	Metaverse: An analysis of definitions	Oct. 2023	All SGs
FGMV-20 (TS)	Definition of metaverse	Dec. 2023	All SGs
FGMV-21 (TR)	Principles for building concepts and definitions related to metaverse	Dec. 2023	All SGs
FGMV-24 (TR)	A framework for confidence in the metaverse	Mar. 2024	SG17
FGMV-25 (TR)	Near-term and long-term Implications for people in the metaverse	Mar. 2024	All SGs
FGMV-32 (TR)	Overview of metaverse	June 2024	All SGs
FGMV-33 (TS)	Glossary for metaverse	June 2024	All SGs, SCV
FGMV-34 (TR)	Definitions of CitiVerse	June 2024	SG20
FGMV-35 (TR)	Building a People-centred CitiVerse	June 2024	SG20

Working Group 2: Applications & Services

Co-Chairs:
- Mr Yuntao WANG (CAICT, China)
- Ms Yuan ZHANG (China Telecom)

Vice-Chairs:
- Mr Ismael ARRIBAS (Spain)
- Mr James Kunle OLORUNDARE (Nigeria)
- Mr Julien MAISONNEUVE (Nokia, Finland)

Terms of reference:

- Use cases for relevant applications and services required by interested parties in each domain, including vertical industries (e.g., Gaming and entertainment, remote work and collaboration, education and training, commerce, real estate, social interactions, health care, tourism, art and culture, etc.)
- High-level requirements for supporting related use cases for specific applications and services

6 Task Groups

- Generative Artificial Intelligence in the metaverse
- Metaverse tourism
- Industrial metaverse
- Medical metaverse
- Media coding
- Power metaverse

WG2 deliverables (8)

Type	Title of deliverable	Timeline	TSAG Allocation
FGMV-09 (TR)	Power metaverse: Use cases relevant to grid side and user side	Oct. 2023	SG20, SG13
FGMV-22 (TS)	Capabilities and requirements of Generative Artificial Intelligence in metaverse applications and services	Dec. 2023	SG16
FGMV-27 (TR)	Guidelines for metaverse application in power system	Mar. 2024	SG20
FGMV-30 (TR)	Overview of the application requirements of metaverse on emergency management in chemical industrial parks	Apr. 2024	SG20
FGMV-36 (TR)	The future of travel in the metaverse: landscape and use cases	June 2024	SG16, SG20
FGMV-37 (TR)	Landscape and use cases for the Industrial metaverse	June 2024	All SGs
FGMV-38 (TS)	Framework and requirements for the construction of human-driven 3D digital human application system for metaverse	June 2024	SG16
FGMV-39 (TS)	Use case and requirements for virtual and real fusion coding in metaverse application	June 2024	SG16

Working Group 3: Architecture & Infrastructure

Chair:
- Mr Hideki Yamamoto (OKI, Japan)

Vice-Chairs:
- Ms Yuan ZHANG (China Telecom)
- Mr Wilmer Azurza Neyra (Ministry of Transport and Communications of the Administration, Peru)

Terms of reference:

- Infrastructure-related issues including use cases, requirements, technical solutions, capabilities for supporting of metaverse platforms and services (e.g., Cloud and edge computing infra, networking infra, blockchain infra, etc.)

- Architectures, their functionalities, interfaces, intelligent management mechanisms, connectivity technologies, APIs, and QoS/QoE, performance, minimum requirements for infrastructure requirements, etc.

WG3 deliverables (3)

Type	Title of deliverable	Timeline	TSAG Allocation
FGMV-31 (TS)	Requirements, functional framework and capability of IoT for metaverse	Apr. 2024	SG20
FGMV-40 (TS)	Multimedia aspect of metaverse architecture	June 2024	SG16
FGMV-41 (TS)	The reference framework of industrial metaverse	June 2024	SG20

Working Group 4:
Virtual/Real World Integration

Chair:
- Ms Shane HE (Nokia, Finland)

Vice-Chair:
- Mr Julien MAISONNEUVE (Nokia, Finland)

Terms of reference:

- Interoperable technologies, including use cases and requirements, to enable the integration of virtual world with real world, and to enable the convergence between virtual world and real world (e.g., Mechanisms for synchronization)

- Structured data models for virtual and real worlds mapping

- Applications and services integration between virtual and real worlds

WG4 deliverables (2)

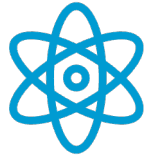| Type	Title of deliverable	Timeline	TSAG Allocation
FGMV-28 (TS)	Requirements for the metaverse based on digital twins enabling integration of virtual and physical worlds	Mar. 2024	SG20
FGMV-29 (TS)	Reference model for the metaverse based on a digital twin enabling integration of virtual and physical worlds	Mar. 2024	SG20
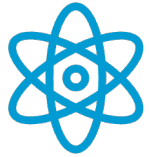
Working Group 5: Interoperability

Chair:
- Mr Hideo IMANAKA (NICT, Japan)

Vice-Chair:
- Mr Wook HYUN (ETRI, Korea)

Terms of reference:

- Use cases and requirements for cross-platform interoperability

- Functional enablers for interoperability of services and applications

- Functional architecture and interfaces for cross-platform interoperability

- Interfaces amongst platform, users and devices

WG5 deliverables (3)

Type	Title of deliverable	Timeline	TSAG Allocation
FGMV-19 (TS)	Service scenarios and high-level requirements for metaverse cross-platform interoperability	Dec. 2023	SG16, SG20, SG13, SG11
FGMV-42 (TR)	Interoperability of identity of things across metaverse platforms	June 2024	SG20
FGMV-43 (TS)	High-level interoperability architecture for cross-platform metaverse	June 2024	SG16

Working Group 6: Security, Data & Personally identifiable information (PII) Protection

Co-Chairs:
- Mr Vincent AFFLECK (United Kingdom)

Vice-Chairs:
- Ms Naying HU (CAICT, China)
- Ms Radia FUNNA (Build n Blaze)
- Ms Hlekiwe KACHALI (UNICEF)
- Mr Bhanujeet CHOUDHARY (XRSI)

Terms of reference:

- Use cases and requirements related to security and PII protection aspects
- Security of networks and technology underpinning the metaverse platform, including cybersecurity and identity management
- Building confidence and security including PII protection-related aspects plus preventing online and offline harm and considering ethical issues and standards
- Consider the issues on trustworthiness related to the metaverse
- Child online protection
- Data ownership and protection
- Digital asset ownership

4 Task Groups
- cybersecurity
- building confidence and security in the metaverse
- child online protection
- issues on trustworthiness related to the metaverse

WG6 deliverables (9)

Type	Title of deliverable	Timeline	TSAG Allocation
FGMV-06 (TR)	Guidelines for consideration of ethical issues in standards that build confidence and security in the metaverse	Oct. 2023	SG17
FGMV-10 (TR)	Cyber risks, threats, and harms in the metaverse	Dec. 2023	SG17
FGMV-11 (TR)	Embedding safety standards and the user control of Personally Identifiable Information (PII) in the development of the metaverse	Dec. 2023	SG17, SG11
FGMV-12 (TR)	Children age verification in the metaverse	Dec. 2023	SG17
FGMV-13 (TR)	Responsible use of AI for child protection in the metaverse	Dec. 2023	SG17
FGMV-23 (TR)	Considering online and offline implications in efforts to build confidence and security in the metaverse	Mar. 2024	SG17
FGMV-44 (TR)	Security for things across metaverses in aspects of data processing and management	June 2024	SG17
FGMV-45 (TR)	Challenges to achieving trustworthy metaverse	June 2024	SG17
FGMV-46 (TR)	The essential components of trusted data use in building a trustworthy metaverse	June 2024	SG17

Working Group 7: Economic, Regulatory & Competition Aspects

Co-Chairs:
- Mr Andrey PEREZ (Anatel, Brazil)
- Mr Okan GERAY (Digital Dubai, UAE)

Vice-Chairs:
- Mr Ahmed SAID (Egypt)

Terms of reference:

- Economic aspects and competition

- Metaverse value chain: main agents' role and interactions

- Impacts on revenues and investments, with a focus on the telecom sector

- Main competitive dynamics: scale and scope economies

- Metaverse potential market failures and regulatory remedies

- Public sector value models

WG7 deliverables (3)

Type	Title of deliverable	Timeline	TSAG Allocation
FGMV-07 (TR)	Policy and regulation challenges of the metaverse	Oct. 2023	SG3
FGMV-14 (TR)	Regulatory and economic aspects in the metaverse: Data protection-related	Dec. 2023	SG3
FGMV-47 (TR)	Economic Value Creation and Competition in metaverse	June 2024	SG3

Working Group 8: Sustainability, Accessibility & Inclusion

Co-Chairs:
- Ms Nevine TEWFIK (Egypt)
- Ms Pilar ORERO (UAB, Spain)

Vice-Chairs:
- Mr Manuel BARREIRO, (Aston Group, Mexico)
- Ms Christina Yan ZHANG, (The Metaverse Institute)
- Mr Khaled KOUBAA, (Medeverse)
- Ms Wendy Teresa GOICO CAMPAGNA (Dominican Republic)

Terms of reference:

- Impact on the climate changes (e.g., Green and low carbon issues, etc.)
- Environmental Sustainability related issues
- Accessibility related issues
- Social considerations
- Diversity, equity and inclusion
- Circular economy related issues

4 Task Groups

- sustainability
- accessibility & inclusion
- sustainable metaverse design
- metaverse social safety

WG8 deliverables (12)

Type	Title of deliverable	Timeline	TSAG Allocation
FGMV-03 (TR)	Guidelines to assess inclusion and accessibility in metaverse standards development	Oct. 2023	SG16
FGMV-04 (TS)	Requirements of accessible products and services in the metaverse: Part I – System design perspective	Oct. 2023	SG16, SG9, SG20
FGMV-05 (TS)	Requirements of accessible products and services in the metaverse: Part II – User perspective	Oct. 2023	SG16, SG9, SG20, SG2
FGMV-08 (TS)	Design criteria and technical requirements for sustainable metaverse ecosystems	Oct. 2023	SG5, SG20
FGMV-15 (TS)	Accessibility requirements for metaverse services supporting IoT	Dec. 2023	SG20, SG16
FGMV-16 (TR)	Accessibility for a sustainable metaverse	Dec. 2023	SG16
FGMV-17 (TR)	Guidelines and requirements on interpreting in the metaverse	Dec. 2023	SG16
FGMV-18 (TR)	Guidance on how to build a metaverse for all: Part I – Legal framework	Dec. 2023	SG16, SG3
FGMV-26 (TS)	Requirements for communication between human-avatar languages in the metaverse	Mar. 2024	SG16, SG13
FGMV-48 (TR)	Guidance on how to build a metaverse for all: Part II - Survey	June 2024	All SGs
FGMV-49 (TR)	Metaverse Sustainability: Driving energy efficiency and GHG emissions reduction	June 2024	SG5
FGMV-50 (TS)	Methodology on assessment of GHG emissions of metaverse	June 2024	SG5

Working Group 9: Collaboration

Co-Chairs:
- Ms Stella KIPSAITA (Communications Authority, Kenya)
- Mr Ziqin SANG (CICT, China)

Terms of reference:

- Promote more active collaboration with other SDOs by setting up a close liaison relationship, including the appointment of an FG-MV liaison rapporteur to other relevant SDOs
- Focal point on collaboration issues, including coordination of incoming and outgoing Liaison Statements in FG-MV
- Develop deliverable on gap analysis, in collaboration with other SDOs
- Develop deliverable on standardization roadmap on metaverse, in collaboration with other SDOs
- Other collaboration-related issues of FG-MV

Task Group
- Gap analysis

WG9 deliverables (2)

Type	Title of deliverable	Timeline	TSAG Allocation
FGMV-51 (TR)	Standardization roadmap for metaverse	June 2024	All SGs
FGMV-52 (TR)	Metaverse standardization landscape for gap analyses	June 2024	All SGs

Unfinished work items (11)

Type	Title of deliverable	WG/TG
Draft TR	Pre-standardisation roadmap for an inclusive and sustainable CitiVerse	WG1/TG-pre-standardization for the CitiVers
Draft TS	Use cases and requirements on immersive audio coding for metaverse applications and services	WG2/TG-media coding
Draft TS	Requirements and framework for extended reality content creation system based on artificial intelligence	WG2/TG-Generative AI
Draft TR	Use case and requirements for remote amusement service with automatic movable robot (AMR) with multimedia functions on metaverse	WG2/TG-metaverse tourism
Draft TR	Medical metaverse: Use-case Relevant to Medical Training and Hospital	WG2/TG-medical metaverse
Draft TR	Requirements and challenge associated with network infrastructure to enable the metaverse	WG3
Draft TS	Setting the framework for an ICT architecture to enable the metaverse	WG3
Draft TR	The framework of building a trustworthy digital human	WG6/TG-trustworthiness in MV
Draft TS	Incentive strategies to boost high-impact sustainable metaverse applications	WG8/TG-sustainable MV design
Draft TS	Metrics and indicators to drive the design of sustainable metaverse applications	WG8/TG-sustainable MV design
Draft TR	Metaverse social safety: mitigating harassment in the metaverse	WG8/TG-metaverse social safety

FG-MV concluded.
But the work will not stop …

Moving forward to ITU-T SGs & other SDOs

ITU-T Study Group 16

Ad Hoc Group on metaverse standardization work in SG16 (AHG-MV)

Established in April 2024, at the ITU-T SG16 meeting

Scope and objectives of AHG-MV

- Coordinate the metaverse standards development work in ITU-T SG16
- Prepare a plan to allocate metaverse standard development items at SG16 according to the ToR of each Question approved at WTSA-24
- Report to the first meeting of ITU-T SG16 (or SG C) in 2025
- (Lifetime) until the first meeting of SG16 (or SG C) in the next study period

AHG-MV meeting on 27-28 August in Geneva with remote participation

- an analysis of the allocation of FG-MV deliverables to the relevant ITU-T SG 16 Questions [refer to SG16-TD396-R1/GEN, AHG-MV report]
- plans to meet once again in December 2024, to refine the allocation proposals and submit it to consideration of the Study Group, planned in Geneva, 13-24 January 2025

ITU-T Next Study Period (2025~2028)

Mandate and ToR of many SGs and its Questions submitted to WTSA-24 includes metaverse related issues

ITU-T Study Group 16 (Multimedia technologies and e-services)

Mandate (extended)

- studies relating to multimedia aspects of metaverse related issues

Lead Study Group role (extended)

- on multimedia aspects of metaverse technologies, applications, systems and services

ITU-T Study Group C (Technologies for multimedia, content delivery and cable television) *[Consolidation of SG9 and SG16]*

Mandate

- studies relating to multimedia aspects of metaverse related issues

Lead Study Group role (extended)

- on immersive multimedia technologies including metaverse and other emerging technologies

World Telecommunication Standardization Assembly (WTSA-24)

- New Delhi, India, 15 – 24 October 2024

* WTSA is held every four years and defines the next period of study for ITU-T.

Third Inter-regional Meeting for WTSA-24 Preparation, 9 September 2024

- APT – Asia-Pacific Telecommunity
- AST – League of Arab States / Arab Standardization Team
- ATU – African Telecommunications Union
- CEPT – European Conference of Postal and Telecommunications Administrations
- CITEL – Inter-American Telecommunication Commission
- RCC – Regional Commonwealth in the Field of Communications

APT Common Proposal on metaverse was adopted based on Korea's proposal

5 Regions except AST are proposing a new Resolution on metaverse !!!

The metaverse continues to evolve and the key is "**standardization**".

Are you ready to join the future metaverse worlds?

Website
www.itu.int/metaverse

Email
sgkang@etri.ew.kr