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| Title: ITU logo | INTERNATIONAL TELECOMMUNICATION UNION  **TELECOMMUNICATION STANDARDIZATION SECTOR**  STUDY PERIOD 2022-2024 | | | TSAG-TD401 |
| TSAG |
| **Original: English** |
| **Question(s):** | | N/A | | Geneva, 22-26 January 2024 |
| **TD (Ref.:** [FG-MV-LS37](http://handle.itu.int/11.1002/ls/sp17-fg-mv-oLS-00037.docx)**)** | | | | |
| **Source:** | | FG-MV | | |
| **Title:** | | LS/i on progress report of the Focus Group on metaverse (FG-MV) to TSAG (updates from June 2023 to December 2023) [from FG-MV] | | |
| **LIAISON STATEMENT** | | | | |
| **For action to:** | | | TSAG | |
| **For information to:** | | | - | |
| **Approval:** | | | FG-MV meeting (Geneva, 7 December 2023) | |
| **Deadline:** | | | N/A | |
| **Contact:** | | | Shin-Gak Kang  FG-MV Chair | E-mail: [sgkang@etri.re.kr](mailto:sgkang@etri.re.kr) |

A new liaison statement has been received from FG-MV.

This liaison statement follows and the original file can be downloaded from the ITU ftp server at <http://handle.itu.int/11.1002/ls/sp17-fg-mv-oLS-00037.docx>.

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|  | INTERNATIONAL TELECOMMUNICATION UNION  **TELECOMMUNICATION STANDARDIZATION SECTOR**  STUDY PERIOD 2022-2024 | | | **FG-MV-LS37** | |
| **Focus Group on metaverse** | |
| **Original: English** | |
| **WG(s):** | | PLEN | | Geneva, 4-7 December 2023 | |
| **Ref.: FG-MV-O-202** | | | | | |
| **Source:** | | FG-MV | | | |
| **Title:** | | LS on progress report of the Focus Group on metaverse (FG-MV) to TSAG (updates from June 2023 to December 2023) | | | |
| **LIAISON STATEMENT** | | | | | |
| **For action to:** | | | TSAG | | |
| **For information to:** | | | - | | |
| **Approval:** | | | **FG-MV meeting (Geneva, 7 December 2023)** | | |
| **Deadline:** | | | N/A | | |
| **Contact:** | | Shin-Gak Kang FG-MV Chair | | | E-mail: [sgkang@etri.re.kr](mailto:sgkang@etri.re.kr) |

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| **Abstract:** | This liaison statement contains the progress report of FG-MV with updates from the June 2023 to December 2023 period. |

## 1 Introduction

The [ITU Focus Group on metaverse (FG-MV)](http://www.itu.int/go/fgmv) was established by TSAG in December 2022.

The objectives of FG-MV, as per the Terms of Reference (ToR, ref. [TSAG-TD164](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T22-TSAG-221212-TD-GEN-0164)), are:

* To study terminology, concepts, vision and ecosystem.
* To identify and study the enabling technologies, their evolution and key tasks for standardization purposes, including multimedia, network optimization, connectivity, interoperability of services and applications, security, protection of personally identifiable information, quality (including bandwidth), digital assets (e.g., digital currencies), IoT, accessibility, digital twin and environmental sustainability.
* To study and gather information to develop a pre-standardization roadmap.
* To build a community of experts and practitioners to unify the concepts, develop common understandings, so that it be benefiting not only the ITU standardization scene but also the global community.
* To identify stakeholders with whom ITU-T could collaborate and establish liaisons and relationships with other organisations that could contribute to the pre-standardisation activities and identify potential collective action and specific next steps.
* To stimulate international collaboration, to share knowledge and best practices, and to explore the opportunities and challenges related to interoperability.
* To provide a platform to share findings and for dialogue on economic, policy and regulatory implications of metaverse related to telecommunication/ICT.

## 2 Focus Group leadership, structure and deliverables

## 2.1 FG-MV leadership

As of December 2022, the FG-MV management team is composed of one Chair and six Vice-Chairs appointed by TSAG:

* Chair: Shin-Gak Kang (ETRI, Rep. of Korea)
* Vice-Chairs:
  + Andrey Perez (Brazil)
  + Hideo Imanaka (NICT, Japan)
  + Per Fröjdh (Ericsson, Sweden)
  + Shane He (Nokia, Finland)
  + Vincent Affleck (United Kingdom)
  + Yuntao Wang (China)

and five additional Vice-Chairs appointed by the FG-MV at the first FG-MV meeting:

* Leonidas Anthopoulos (University of Thessaly, Greece​)
* Manuel Barreiro (Aston Group, Mexico)
* Cristina Martinez (European Commission)
* Stella Kipsaita (Communications Authority, Kenya)
* Natalia Bayona (World Tourism Organization (UNWTO))

## 2.2 FG-MV structure

FG-MV established nine working groups and a series of task groups with chairships as follows:

* **Working Group 1 (WG1): General** under the chairship of Mr Leonidas Anthopoulos (University of Thessaly, Greece) and the vice-chairship of Mr Younghwan Choi (ETRI, Rep. of Korea) and Ms Radia Funna (Build n Blaze)
  + **Task Group on terminology & definitions** under the chairship of ​​Ms Xiaomi An (Renmin University of China, Ch​ina)
  + **Task Group on implications for people in the metaverse** under the chairship of Ms Radia Funna (Build n Blaze)
  + **Task Group on pre-standardization for the CitiVerse** ​​under the chairship of Ms Cristina Martinez (European Commission) and Ms Christina Yan Zhang (The Metaverse Institute)
* **Working Group 2 (WG2): Applications & Services**​ under the co-chairship of Mr Yuntao Wang (China) and Ms Yuan Zhang (China Telecom) and the vice-chairship of Mr Ismael Arribas (Spain) and Mr James Kunle Olorundare (Nigeria)
  + **Task Group on media coding** under the co-chairship of ​Mr Zekun Wang (China Telecom, China) and Mr Marcelo Moreno (Fraunhofer IIS, Germany)
  + **Task Group on Generative Artificial Intelligence in the metaverse** under the chairship of Ms Qiuhong Zheng (China Telecom, China) and the vice-chairship of Ms Liang Wang (ZTE)
  + **Task Group on Embodied Artificial Int​elligence for metaverse** under the chairship of ​ Ms Xiaoou Liu (China Telecom)
  + **Task Group on metaverse tourism** under the chairship of Ms Salma Arafa (United Nations World Tourism Organization)
  + **Task Group on medical metaverse** under the chairship of Mr Robin Rowe​ (Heroic Robots)
  + **Task Group on power metaverse** under the chairship of Mr Jie Song​​ (State Grid Corporation of China)
  + **Task Group on Industrial metaverse** under the chairship of Mr Julien Maisonneuve (Nokia, Finland)
* **Working Group 3 (WG3): ​​Architecture & Infrastructure** under the chairship of Mr Hideki Yamamoto (OKI, Japan) and the vice-chairship of Ms Yuan Zhang (China Telecom, China) and Mr Wilmer Azurza Neyra (Ministry of Transport and Communications of the Administration, Peru)
* **Working Group 4 (WG4): Virtual/Real World Integration** under the chairship of Ms Shane He (Nokia, Finland)
* **Working Group 5 (WG5): Interoperability** under the chairship of ​​Mr Hideo Imanaka (NICT, Japan) and the vice-chairship of Mr Wook Hyun (ETRI, Rep. of Korea)
* **Working Group 6 (WG6): Security, Data & Personally identifiable information (PII)​ Protection** under the chairship of ​​Mr Vincent Affleck (United Kingdom), and the vice-chairship of Ms Naying Hu (CAICT, China), Ms Radia Funna (Build n Blaze), Ms Hlekiwe Kachali (UNICEF) and Mr Bhanujeet Choudhary (XRSI).
  + **Task Group on cybersecurity** under the co-chairship of Christian Alvarez (UNICEF) and Hanna Linderstål (EARHART Business Protection Agency)
  + **Task Group on building confidence and security in the metaverse** under the chairship of Ms Radia Funna (Build n Blaze)
  + **Task Group on child online protection** under the chairship of Mr Muhammad Khurram Khan (King Saud University, Kingdom of Saudi Arabia)
  + **Task Group on issues on trustworthiness related to the metaverse** under the chairship of Mr Gyu Myoung Lee (KAIST)
* **Working Group 7 (WG7): Economic, regulatory & competition aspects** under the co-chairship of ​​Mr Andrey Perez (Anatel, Brazil) and Mr Okan Geray (Digital Dubai, UAE) and the vice-chairship of Mr Ahmed Said (Egypt).
* **Working Group 8 (WG8): Sustainability, Accessibility & Inclusion**​ under the co-chairship of Ms Nevine Tewfik (Egypt) and Ms Pilar Orero (Universitat Autònoma de Barcelona, Spain) and the vice-chairship of Mr Manuel Barreiro (Aston Group, Mexico), Ms Christina Yan Zhang (The Metaverse Institute) and Mr Khaled Koubaa (Medeverse)
  + **Task Group on sustainability** under the chairship of ​ Ms Shuguang Qi (CAICT, China)​
  + **Task Group on accessibility & inclusion** under the co-chairship of Ms Paola Cecchi-Dimeglio (Harvard University) and Mr Yong Jick Lee (Center for Accessible ICT, Rep. of Korea)
  + **Task Group on sustainable metaverse design**​ under the chairship of Ms Daniela Tulone (CNIT, Italy)
  + **Task Group on metaverse social safety** under the chairship of Ms Gabrielle Pantera (Heroic Robots)​
* **Working Group 9 (WG9): Collaboration** under the co-chairship of Ms Stella Kipsaita (Communications Authority, Kenya) and Mr Ziqin Sang (CICT, China)
  + Task Group on gap analysis under the co-chairship of Mr Leonidas Anthopoulos (University of Thessaly, Greece) and Ms Jungha Hong (ETRI, Korea (Republic of)​)​

## 2.3 FG-MV Work Plan

Annex A on FG-MV Workplan summarizes the FG-MV structure and the list of deliverables, along with information concerning the designated Chairs and Vice-Chairs for the Working Groups (WGs) and Task Groups (TGs).

**3 Summary of meetings and participation**

FG-MV was established for an initial lifetime of 12 months from its first meeting (March 2023 to March 2024). Since its establishment, FG-MV has held four meetings and has achieved key agreements on its structure and leadership, as well as making progress on its tasks and deliverables and it has also collaborated with related groups on metaverse-related topics. The meetings were announced via the TSB Circular, the Focus Group website and the FG-MV mailing list. Remote participation was offered for each meeting.

The summary of meetings is in Table 1, below.

**Table 1 - Summary of FG-MV meetings and participation as of December 2023**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Riyadh, 8–9 March 2023** | **Shanghai, 4-6 July 2023** | **Geneva, 3-5 October 2023** | **Geneva, 4-7 December 2023** |
| **Host** | National Cybersecurity Authority (NCA), Kingdom of Saudi Arabia | China Academy of Information and Communications Technology (CAICT), China | - | - |
| **Contributions** | 41 | 128 | 103 | 86 |
| **Administrative (from TSB and FG-MV Management Team)** | 14 | 22 | 43 | 45 |
| **Incoming Liaison Statements** | 2 | 8 | 14 | 12 |
| **Outgoing Liaison Statements** | 2 | 11 | 13 | 10 |
| **Meeting report** | [FGMV-O-006-R2](https://extranet.itu.int/sites/itu-t/focusgroups/mv/output/FGMV-O-006-R2.docx) | [FGMV-O-068-R1](https://extranet.itu.int/sites/itu-t/focusgroups/mv/output/FGMV-O-068-R1.docx) | [FGMV-O-133-R2](https://extranet.itu.int/sites/itu-t/focusgroups/mv/output/FGMV-O-133-R2.docx) | [FGMV-O-199-R2](https://extranet.itu.int/sites/itu-t/focusgroups/mv/output/FGMV-O-199-R2.docx) |
| **Total participants** | 656 | More than 2000 | 248 | 277 |

## 3.1 Future meetings

The fifth FG-MV meeting will take place from 5–8 March 2024, preceded by the ITU Forum on “Shaping the CitiVerse: People centred cities & virtual worlds” to take place on 4 March 2024, in Queretaro, Mexico.

The list of planned FG-MV Working Group and Task Group meetings and e-meetings ​​is available [here](https://extranet.itu.int/sites/itu-t/focusgroups/mv/wg/SitePages/Home.aspx).

Remote participation will be offered for all meetings.

Further additional meetings may be held if TSAG approves an extension of the Focus Group lifetime.

## 3.2 Interim Activities of the Working Groups and Task Groups

Table 2 below provides information on the interim activities carried out by the nine Working Groups including the Task Group on Collaboration which subsequently became Working Group 9.

**Table 2 - Interim Activities of the Working Groups and Task Groups since the first meeting of FG-MV concluded on 9 March 2023**

|  |  |  |
| --- | --- | --- |
| **WG/TG** | **No. of meetings** | **Total no. of input documents** |
| **Working Group 1 - General** | 4 | 46 |
| **​TG-terminology & definitions** | 3 | 7 |
| **TG- pre-standardization for the CitiVerse** | 1 | 2 |
| **TG-​implications for people in the metaverse** | - | 8 |
| **Working Group 2 - Applications & Services** | 3 | 43 |
| **T​G-media co​ding** | 6 | 13 |
| ​**TG-Generative Artificial Intelligence in the metaverse** | 1 | 2 |
| **TG- Embodied Artificial Intelligence for metaverse** | To start the work in January 2024 | |
| **TG-medical metaverse** | 2 | 2 |
| **TG-metaverse tourism** | To start the work in January 2024 | |
| **TG-power metaverse** | 1 | 3 |
| **TG-Industrial metaverse** | To start the work in January 2024 | |
| **​​ Working Group 3 - Architecture & Infrastructure** | 13 | 47 |
| **Working Group 4 - Virtual/Real World Integration** | 3 | 7 |
| **Working Group 5 – Interoperability** | 9 | 44 |
| **​​ Working Group 6 - Security, Data & PII Protection** | 4 | 72 |
| **TG-cybersecurity** | 3 | 3 |
| **TG-building confidence and security in the metaverse** | 4 | 8 |
| **TG-child online protection** | 3 | 11 |
| ​**TG-issues on trustworthiness related to the metaverse** | 4 | 11 |
| **Working Group 7 - Economic, regulatory & competition aspects** | 4 | 8 |
| **Working Group 8 - Sustainability, Accessibility & Inclusion​** | 7 | 77 |
| **TG-sustainability** | 7 | 12 |
| **TG-accessibility & inclusion** | 5 | 23 |
| **TG-sustainable metaverse design​** | 2 | 4 |
| **TG-metaverse social safety** | 2 | 3 |
| **Working Group 9 – Collaboration** | 2 | 6 |
| **TG-gap analysis** | To start the work in January 2024 | |

**4 Summary of other activities**

In addition to FG-MV meetings, Special Sessions, forums, and webinars were organized in 2023 to promote wider participation of metaverse experts in FG-MV and solicit more contributions to advance work on FG deliverables.

The FG-MV has held two special sessions in 2023:

|  |  |
| --- | --- |
| * The [1st Special Session of ITU Focus Group on metaverse (FG-MV)](https://www.itu.int/metaverse/1st-special-session-fg-mv/) took place in Arusha, Tanzania, on 12 September 2023. The Special Session was held as a physical event with remote participation. A Virtual Exhibition on the FG-MV in the metaverse was held during the Special Session. The presentations and recording of the Special Session can be found [here](https://www.itu.int/metaverse/1st-special-session-fg-mv/). | image |

* The [2nd Special Session of ITU Focus Group on metaverse (FG-MV)](https://www.itu.int/metaverse/2nd-special-session-fg-mv/) took place in Riga, Latvia, on 18 October 2023. It was held as part of 5G Techritory Forum 2023, and was held as a physical event with webcast. The Special Session was followed by a co-creation workshop on metaverse vision for Europe, which concluded with the adoption of the Call to Action. The Call to Action can be found [here](https://s43678.pcdn.co/wp-content/uploads/2023/12/Call-to-Action-Riga.pdf).

Three Forums have been held in 2023:

* ITU and N​ational Cybersecurity Authority (NCA) of the Kingdom of Saudi Arabia co-organized the [1st ITU Forum on “Embracing the metaverse”](https://www.itu.int/en/ITU-T/ssc/Pages/1st-forum-metaverse.aspx), which took place on 7 March 2023, in Riyadh, Kingdom of Saudi Arabia. The forum was held as a physical event with remote participation. The presentations, outcome document and video highlights of the forum can be found [here](https://www.itu.int/en/ITU-T/ssc/Pages/1st-forum-metaverse.aspx).

|  |  |
| --- | --- |
| * The [2nd ITU Forum on “Creating a metaverse for all through international standards”](https://www.itu.int/metaverse/2nd-forum-metaverse/) took place on 7 July 2023, in Shanghai, China, in conjunction with the World Artificial Intelligence Conference (WAIC). The forum was held as a physical event with remote participation and was hosted by China Academy of Information and Communications Technology (CAICT) and Shanghai Artificial Intelligence Industry Association (SAIA). The presentations, outcome document and video highlights of the forum can be found [here](https://www.itu.int/metaverse/2nd-forum-metaverse/). |  |

* ITU and Tanzania co-organized the [3rd ITU Forum on “Cities and the metaverse: shaping a citiverse for all”](https://www.itu.int/cities/3rd-forum-metaverse/), which took place on 13 September 2023, in Arusha, Tanzania. The forum was organized as a physical event with remote participation. The Forum concluded with the adoption of the [Arusha Call to Action](https://www.itu.int/cities/wp-content/uploads/2023/09/Tanzania-Arusha-Call-to-Action.pdf) which reflected key issues discussed at the Forum. The Call to Action, presentations, outcome document and recording of the forum can be found [here](https://www.itu.int/cities/3rd-forum-metaverse/).

Six webinars have been held in the framework of STI Forum, HLPF Forum and [ITU Digital Transformation webinar series](https://www.itu.int/cities/standards4dt/). The presentations, outcome document and recordings can be found [here](https://www.itu.int/cities/standards4dt/).

* [STI Forum 2023 Side event on Leveraging the metaverse in cities to achieve the SDGs](https://www.itu.int/cities/standards4dt/ep25/), Virtual, 4 May 2023
* [HLPF Forum side event on Exploring the metaverse: A New World of Possibilities for Cities and Communities](https://www.itu.int/cities/hlpf-side-event-metaverse-cities/), Virtual, 13 July 2023
* [Episode #32: “Fashioning” the Metaverse to Accelerate Digital Transformation: What has gone out of style](https://www.itu.int/cities/standards4dt/ep32/), Virtual, 2 October 2023
* [Episode #34: What is a citiverse ? And how can it contribute to sustainable city development?](https://www.itu.int/cities/standards4dt/ep34/), Virtual, 24 October 2023
* [Episode #35: How to successfully develop People-Centred citiverse?](https://www.itu.int/cities/standards4dt/ep35/), Virtual, 30 October 2023

The [ITU-UNWTO Executive briefing](https://www.itu.int/en/publications/Documents/tsb/2023-Executive-briefing-on-the-metaverse/index.html#p=1) on the metaverse was published in May 2023, and was contributed to and reviewed by more than 40 experts from the FG-MV management team. The Executive briefing can be found [here](https://www.itu.int/metaverse).

A new ITU webpage dedicated to ITU’s activities on metaverse has been created and is available at: [www.itu.int/metaverse](http://www.itu.int/metaverse).

In addition, a series of activities on metaverse are planned for 2024:

* The 4th ITU Forum on “Shaping the CitiVerse: People centred cities & virtual worlds” to take place on 4 March 2024 in Queretaro, Mexico.
* ITU/TSB has been requested by the FG-MV to organize a UN metaverse day, together with the UN family, in Geneva in 2024.
* ITU/TSB has been requested by the FG-MV to launch an Initiative on Virtual Worlds *– Discovering Citiverse* in 2024.

## 5 Relationships

As an open and collaborative platform on the pre-standardization aspects of metaverse, FG-MV has established liaison relationships with the following relevant groups: ITU-T Study Groups SG2, SG3, SG5, SG9, SG11, SG12, SG13, SG15, SG16, SG17 and SG20, TSAG, ITU-R Study Groups SG5 and SG6, ITU-D Study Groups SG1 and SG2, IEEC, CEN/CENELEC, ETSI, ANSI, NIST, SA, BSI, IEC SEG15, IEC TC57, IEC TC65, IEC TC79, IEC TC85, IEC TC100, ISO TC68, ISO TC69, ISO TC133, ISO TC184, ISO TC 307, ISO/IEC JTC1 SC24, ISO/IEC JTC1 SC27, ISO/IEC JTC1 SC29, ISO/IEC JTC1 SC35, ISO/IEC JTC1 SC38, ISO/IEC JTC1 SC41, ISO/IEC JTC 1 SC42, ISO/IEC JTC1 SC43, IEEE SA, W3C, IETF, ETSI ISG-ARF, ETSI TC Cyber, 3GPP SA1, 3GPP SA4, IPv6 Forum, Broadband Forum, TMForum, INATBA, ITU IRG AVA, World Metaverse Council, Metaverse Standards Forum, Open Metaverse Foundation, Digital Twin Consortium, VRM consortium, IOWN Global Forum, Standards Australia, Khronous Group, OMA3 .

FG-MV has taken note of the ongoing metaverse-related standardization activities and work items across ITU-T Study Groups and external groups. FG-MV has received 37 incoming liaison statements from ITU Study Groups and the external groups.

FG-MV has also regularly reported its progress on its draft deliverables to all its liaison groups and has been sending outgoing liaison statements to all its liaison groups. 37 outgoing liaison statements have been sent out.

In anticipation of the completion of its work, FG-MV stands ready to collaborate with TSAG and relevant Study Groups in the transfer of its deliverables as appropriate.

## 6 Proposed extension of the FG-MV lifetime

Japan and Korea (Republic of) submitted contributions (as contained in [FGMV-I-453](https://extranet.itu.int/sites/itu-t/focusgroups/mv/input/FGMV-I-453.docx) and [FGMV-I-470](https://extranet.itu.int/sites/itu-t/focusgroups/mv/input/FGMV-I-470.docx)) to extend the lifetime until March 2025. There were different views on the duration of the extension. Consensus was reached to request TSAG to consider extending the lifetime until June 2024.

**Action for TSAG:**

* The FG-MV would like to request TSAG to consider the extension of the lifetime of the Focus Group from March 2024 until June 2024.
* FG-MV has approved 22 deliverables and would like to invite TSAG to consider the proposed allocation to various ITU-T Study Groups and other entities as contained in Table 3.

**Table 3 – FG-MV approved deliverables**\*() entities or groups that might be interested in these deliverables

| **No.** | **Title** | **Approved** | **Proposed allocation to ITU-T Study Groups and/or other entities** |
| --- | --- | --- | --- |
| [FGMV-01](http://handle.itu.int/11.1002/pub/82047d78-en) | Technical Report on Exploring the metaverse: opportunities and challenges​ | July 2023 | ITU-T SG3, SG16, SG20 (ITU-D SGs) |
| [FGMV-02](https://www.itu.int/en/ITU-T/focusgroups/mv/Documents/List%20of%20FG-MV%20deliverables/FGMV-02.pdf) | Technical Report on Metaverse: an analysis of definitions | October 2023 | ITU-T SG3 and SG16 (SG20, ITU-T SCV, ITU-D SGs) |
| [FGMV-03](https://www.itu.int/en/ITU-T/focusgroups/mv/Documents/List%20of%20FG-MV%20deliverables/FGMV-03.pdf) | Technical Report on Guidelines to assess inclusion and accessibility in metaverse standard development | October 2023 | ITU-T SG16 (ITU-T SG9, ITU-T SG20, JCA-AHF, IRG-AVA) |
| [FGMV-04](https://www.itu.int/en/ITU-T/focusgroups/mv/Documents/List%20of%20FG-MV%20deliverables/FGMV-04.pdf) | Technical Specification on Requirements of accessible products and services in the metaverse: Part I – System design perspective | October 2023 | ITU-T SG16, ITU-T SG9, ITU-T SG20 (JCA-AHF, IRG-AVA) |
| [FGMV-05](https://www.itu.int/en/ITU-T/focusgroups/mv/Documents/List%20of%20FG-MV%20deliverables/FGMV-05.pdf) | Technical Specification on Requirements of accessible products and services in the metaverse: Part II – User perspective | October 2023 | ITU-T SG16, ITU-T SG9, ITU-T SG20 (JCA-AHF, IRG-AVA) |
| [FGMV-06](https://www.itu.int/en/ITU-T/focusgroups/mv/Documents/List%20of%20FG-MV%20deliverables/FGMV-06.pdf) | Technical Report on Guidelines for consideration of ethical issues in standards that build confidence and security in the metaverse | October 2023 | ITU-T SG17, ITU-T SG16 (OHCHR, UNDESA) |
| [FGMV-07](https://www.itu.int/en/ITU-T/focusgroups/mv/Documents/List%20of%20FG-MV%20deliverables/FGMV-07.pdf) | Technical Report on Policy and regulation opportunities and challenges in the metaverse | October 2023 | ITU-T SG3 (ITU-T SG16, ITU-T SG17, ITU-T SG20) |
| [FGMV-08](https://www.itu.int/en/ITU-T/focusgroups/mv/Documents/List%20of%20FG-MV%20deliverables/FGMV-08.pdf) | Technical Specification on Design criteria and technical requirements for sustainable metaverse ecosystem | October 2023 | ITU-T SG5 (ITU-T SG16, ITU-T SG13, ITU-T SG20, UNDESA) |
| [FGMV-09](https://www.itu.int/en/ITU-T/focusgroups/mv/Documents/List%20of%20FG-MV%20deliverables/FGMV-09.pdf) | Technical Report on Power metaverse: Use cases relevant to grid side and user side | October 2023 | ITU-T SG16 and ITU-T SG20 |
| [FGMV-10](https://www.itu.int/en/ITU-T/focusgroups/mv/Documents/List%20of%20FG-MV%20deliverables/FGMV-10.pdf) | Technical Report on Cyber risks, threats, and harms in the metaverse | December 2023 | ITU-T SG17 |
| [FGMV-11](https://www.itu.int/en/ITU-T/focusgroups/mv/Documents/List%20of%20FG-MV%20deliverables/FGMV-11.pdf) | Technical Report on Embedding safety standards and the user control of Personally Identifiable Information (PII) in the development of the metaverse | December 2023 | ITU-T SG17 and ITU-T SG16 |
| [FGMV-12](https://www.itu.int/en/ITU-T/focusgroups/mv/Documents/List%20of%20FG-MV%20deliverables/FGMV-12.pdf) | Technical Report on Children's age verification in the metaverse | December 2023 | ITU-T SG17 (UNICEF and ITU-D SG2) |
| [FGMV-13](https://www.itu.int/en/ITU-T/focusgroups/mv/Documents/List%20of%20FG-MV%20deliverables/FGMV-13.pdf) | Technical Report on Responsible Use of AI for Child Protection in the metaverse | December 2023 | ITU-T SG17 (ITU-T SG3, UNICEF and ITU-D SG2) |
| [FGMV-14](https://www.itu.int/en/ITU-T/focusgroups/mv/Documents/List%20of%20FG-MV%20deliverables/FGMV-14.pdf) | Technical Report on Regulatory and economic aspects in the metaverse: Data protection-related | December 2023 | ITU-T SG3 (ITU-T SG17, ITU-T SG20) |
| [FGMV-15](https://www.itu.int/en/ITU-T/focusgroups/mv/Documents/List%20of%20FG-MV%20deliverables/FGMV-15.pdf) | Technical Specification on Accessibility requirements for metaverse services supporting IoT | December 2023 | ITU-T SG20 (ITU-T SG16, ITU-T SG9, JCA-AHF, IRG-AVA) |
| [FGMV-16](https://www.itu.int/en/ITU-T/focusgroups/mv/Documents/List%20of%20FG-MV%20deliverables/FGMV-16.pdf) | Technical Report on Accessibility in a sustainable metaverse | December 2023 | ITU-T SG16 (ITU-T SG9, ITU-T SG20, JCA-AHF, IRG-AVA) |
| [FGMV-17](https://www.itu.int/en/ITU-T/focusgroups/mv/Documents/List%20of%20FG-MV%20deliverables/FGMV-17.pdf) | Technical Report on Guidelines and requirements on interpreting in the metaverse | December 2023 | ITU-T SG16 (ITU-T SG9, ITU-T SG20, JCA-AHF, IRG-AVA) |
| [FGMV-18](https://www.itu.int/en/ITU-T/focusgroups/mv/Documents/List%20of%20FG-MV%20deliverables/FGMV-18.pdf) | Technical Report on Guidance on how to build a metaverse for all – Part I: Legal Framework | December 2023 | ITU-T SG16 (ITU-T SG9, ITU-T SG20, JCA-AHF, IRG-AVA) |
| [FGMV-19](https://www.itu.int/en/ITU-T/focusgroups/mv/Documents/List%20of%20FG-MV%20deliverables/FGMV-19.pdf) | Technical Specification on Service scenarios and high-level requirements for metaverse cross-platform interoperability | December 2023 | ITU-T SG16 |
| [FGMV-20](https://www.itu.int/en/ITU-T/focusgroups/mv/Documents/List%20of%20FG-MV%20deliverables/FGMV-20.pdf) | Technical Specification on Definition of metaverse | December 2023 | ITU-T SG16 (SG3, SG20, ITU-T SCV) |
| [FGMV-21](https://www.itu.int/en/ITU-T/focusgroups/mv/Documents/List%20of%20FG-MV%20deliverables/FGMV-21.pdf) | Technical Report on Principles for building concepts and definitions related to metaverse | December 2023 | ITU-T SG16 (SG3, SG20, ITU-T SCV) |
| [FGMV-22](https://www.itu.int/en/ITU-T/focusgroups/mv/Documents/List%20of%20FG-MV%20deliverables/FGMV-22.pdf) | Technical Specification on Capabilities and requirements of generative artificial intelligence in metaverse applications and services | December 2023 | ITU-T SG16 (ITU-T SG9, ITU-T SG20) |

# Annex A – FG-MV structure and list of deliverables (as approved on 7 December 2023)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **FG/ ​​WGs​** | **Subgroup** | **Leadership positions** | **ToR** | **Type** | **Title of deliverable** | **Editors​** |
| **​ FG​​** | **metavers​e** |  |  | Template  [*Approved at the second FG-MV meeting*] | Use case template | Wook HYUN (ETRI, Korea (Republic of)), FG-MV Chair and WG Chairs |
| **​​WG 1​​** | **General** | Chair:   * ​Mr Leonidas ANTHOPOULOS (University of Thessaly, Greece)   Vice-Chairs:   * ​Mr Younghwan CHOI (ETRI, Korea (Republic of)) * Ms Radia FUNNA (Build n Blaze) | * ​​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 | Technical Specification | Overview of metaverse  ​ | Younghwan CHOI (ETRI, Korea (Republic of)) |
| Technical Report  [*Approved at the second FG-MV meeting*] | Exploring the metaverse: opportunities and challenges | Leonidas ANTHOPOULOS (University of Thessaly, Greece) |
| **​TG-terminology & definitions** | Chair:   * ​​Ms Xiaomi AN (Renmin University of Ch​ina) |  | Technical Specification | Vocabulary for metaverse | Xiaomi AN (Renmin, University of China)  Jie SONG (State Grid Corporation of China) |
| Technical Report  [*Approved at the fourth FG-MV meeting*] | Principles for building concepts and definitions related to metaverse | Xiaomi AN (Renmin University of China) |
| Technical Report  [*Approved at the third FG-MV meeting*] | Metaverse: An analysis of definitions | Leonidas ANTHOPOULOS (University of Thessaly, Greece) |
| Technical Specification  [*Approved at the fourth FG-MV meeting*] | Definition of metaverse | Leonidas ANTHOPOULOS (University of Thessaly, Greece)  Xiaomi AN (Renmin University of China)  Radia FUNNA (Build n Blaze)  Christina Yan ZHANG (The Metaverse Institute) |
| Technical Specification | Definition of CitiVerse | Leonidas ANTHOPOULOS (University of Thessaly, Greece)  Xiaomi AN (Renmin University of China)  Radia FUNNA (Build n Blaze)  Christina Yan ZHANG (The Metaverse Institute) |
| **TG- pre-standardization for the CitiVerse** | Co-Chairs:   * ​​Ms Cristina MARTINEZ (European Commission) * Ms Christina Yan ZHANG (The Metaverse Institute) |  | Technical Report | Pre-standardisation roadmap for an inclusive and sustainable CitiVerse | Cristina MARTINEZ and Miguel Alvarez RODRIGUEZ (European Commission) |
| Technical Report | Building a People-centred CitiVerse | Christina Yan ZHANG (The Metaverse Institute)  Nicholas YOU (Guangzhou Institute for Urban Innovation)  Teppo T Rantanen (The City of Tampere)  Leonidas ANTHOPOULOS (University of Thessaly, Greece)  Irina KARAGYAUR (BQ9) |
| **TG-​implications for people in the metaverse** | ​Chair:   * Ms Radia FUNNA (Build n Blaze) | ​ | ​ Technical ​Report | ​ Near-term and long-term implications for people in the metaverse | ​ Radia FUNNA (Build n Blaze) |
| Technical Specification | A framework for confidence in the metaverse | Radia FUNNA (Build n Blaze) |
| **WG2** | **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) | * 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 | Technical Report | Overview of the application requirements of metaverse on emergency management in chemical industrial parks | Ziqin SANG (CICT, China)  Keng LI (CICT, China)  Hao WU (CICT, China) |
| **T​G-media co​ding** | Co-Chairs:   * ​Mr Zekun WANG (China Telecom) * Mr Marcelo MORENO​ (Fraunhofer IIS, Germany) |  | Tech​nical Specification | Use case and requirements for virtual and real fusion coding in metaverse application | Zekun WANG (China Telecom) |
| Tech​nical Specification | Use cases and requirements on immersive audio coding for metaverse applications and services | Marcelo MORENO (Fraunhofer IIS, Germany) |
| ​**TG-Generative Artificial Intelligence in the metaverse** | ​Chair:   * Ms Qiuhong ZHENG​ (China Telecom)   Vice-Chair:   * Ms Liang WANG (ZTE) | ​ | Technical Specification | Framework and requirements for the construction of 3D human driven digital human application system based on image recognition algorithm | Qiuhong ZHENG (China Telecom) Liang WANG (ZTE) |
| Technical Specification  [*Approved at the fourth FG-MV meeting*] | Capabilities and requirements of Generative Artificial Intelligence in metaverse applications and services | Qiuhong ZHENG (China Telecom) Liang WANG (ZTE) |
| Technical Specification | Requirements and framework for extended reality content creation system based on artificial intelligence | Jiaxin WEI (China Unicom)  Liya YUAN (ZTE)  Zehua HU (China Telecom) |
| **TG- Embodied Artificial Intelligence for metaverse** | Chair:   * Ms Xiaoou LIU​ (China Telecom) |  |  |  |  |
| **TG-medical metaverse** | Chair:   * Robin ROWE (Heroic Robots) |  | Technical Report | Medical metaverse: use-case relevant to medical training and hospital | Robin ROWE (Heroic Robots) |
| **TG-metaverse tourism** | Chair:   * Salma ARAFA (UNWTO) |  | Technical Report | Guidelines and use cases on tourism in the metaverse | Salma ARAFA (UNWTO) |
| Technical Report | Use case and requirements for remote amusement service with automatic movable robot (AMR) with multimedia functions on metaverse | Hideki YAMAMOTO (Oki, Japan) |
| **TG-power metaverse** | Chair:   * Mr Jie SONG (State Grid Corporation of China) |  | Technical Report  [*Approved at the third FG-MV meeting*] | Power metaverse: Use Cases Relevant to Grid Side and User Side | Jie SONG (State Grid Corporation of China) |
| Technical Specification | Guidelines for metaverse application in energy power | Dong WANG (State Grid Corporation of China) |
| **TG-Industrial metaverse** | Chair:   * Mr Julien MAISONNEUVE (Nokia, Finland) |  | Technical Report | Landscape and Use cases for the Industrial metaverse | Julien MAISONNEUVE (Nokia, Finland) |
| **​​WG 3** ​ | **​​Architecture & Infrastructure** | ​​ Chair:   * Mr Hideki YAMAMOTO (OKI, Japan)   Vice-Chairs:   * Ms Yuan ZHANG (China Telecom, China) * ​Mr Wilmer Azurza Neyra (Ministry of Transport and Communications of the Administration, Peru) | * ​​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. | Technical Report | Requirements and challenge associated with network infrastructure to enable the metaverse | Meiling DAI, Jingwen LI, Xingyu SHANG, Xiaoou LIU (China Telecom, China) |
| Technical Specification | Requirements and reference framework of IoT-based metaverse service | Yi XIE, Jie CHENG, Minshi CHEN, Yue WANG (China Mobile, China) Chao MA, Ye SUN (CAICT, China), |
| Technical Specification | Reference architecture of industrial metaverse | Cheng CHI , Zihang YIN, Can LUO (CAICT, China) |
| Technical Specification | Settin​g the framework for an ICT architecture to enable the metaverse | Sophia PAPATHANASOPOULOU (General Secretariat of Telecommunications and Post of the Ministry of Digital Governance, Greece)  Leonidas ANTHOPOULOS (University of Thessaly, Greece) |
| Technical Specification | Multimedia aspect of metaverse architecture | Hideki YAMAMOTO (OKI, Japan) |
| **WG 4** | **Virtual/Real World Integration** | Chair:   * ​​Ms Shane HE (Nokia, Finland) | * 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 | Technical Specification | Use cases and requirements for the metaverse based on digital twins enabling integration of virtual and physical worlds​ | Changkyu LEE (ETRI, Korea (Republic of)) |
| Technical Specification | Reference model for the metaverse based on a digital twin enabling integration of virtual and physical worlds | Haksuh KIM (ETRI, Korea (Republic of)) |
| **WG ​5** | **Interoperability** | Chair:   * ​​Mr Hideo IMANAKA (NICT, Japan)   Vice-Chair:   * Mr Wook HYUN (ETRI, Korea (Republic of)) | * ​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 | Technical Specification  [*Approved at the fourth FG-MV meeting*] | Service scenarios and high-level requirements for metaverse cross-platform interoperability | Jungha HONG (ETRI, Korea (Republic of))  Wook HYUN (ETRI, Korea (Republic of))  MiYoung HUH (ETRI, Korea (Republic of))  Xiaojun MU (China Unicom) |
| Technical Specification | High-level interoperability architecture for cross-platform metaverse | Wook HYUN (ETRI, Korea (Republic of))  Xiongwei JIA (China Unicom) |
| Technical Specification | Interoperability of identity of things across metaverses | Xiongwei JIA (China Unicom) |
| **​​​​​W​G 6​** | **​​Security, Data & PII Protection** | ​​ Chair:   * ​​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) | * ​​​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 Personally identifiable information (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 |  |  |  |
| **TG-cybersecurity** | Co-Chairs:   * Mr Christian ALVAREZ (UNICEF) * Ms Hanna LINDERSTÅL (EARHART Business protection agency) ​ |  | Technical Specification | Data management and security for things across metaverses | Xiongwei JIA (China Unicom) |
| Technical Report  [*Approved at the fourth FG-MV meeting*] | Cyber risks, threats, and harms in the metaverse | Aljawharah ALSALEM (NCA, Kingdom of Saudi Arabia)  Hussain ALDAWOOD (NEOM, Kingdom of Saudi Arabia) |
| Technical Specification | Security framework for the metaverse architecture | Sarah ABANUMAY (National Cybersecurity Authority (NCA), Kingdom of Saudi Arabia)  Aljawharah ALSALEM (NCA, Kingdom of Saudi Arabia) |
| Technical Specification | Identity management Security guidelines in the metaverse | Sarah ABANUMAY (NCA, Kingdom of Saudi Arabia) Aljawharah ALSALEM (NCA, Kingdom of Saudi Arabia) |
| Technical Specification | Guidelines for security management of using metaverse applications | Sarah ABANUMAY (NCA, Kingdom of Saudi Arabia) Aljawharah ALSALEM (NCA, Kingdom of Saudi Arabia) |
| Technical Specification | Asset management Security guidelines for owners within the metaverse | Aljawharah Alsalem (NCA, Kingdom of Saudi Arabia)  Betania ALLO (NEOM, Kingdom of Saudi Arabia) |
| **TG-building confidence and security in the metaverse** | Chair:   * Ms Radia FUNNA (Build n Blaze) |  | Technical Report  [*Approved at the third FG-MV meeting*] | Guidelines for consideration of ethical issues in standards that build confidence and security in the metaverse | Radia FUNNA (Build n Blaze)  Gayoung PARK  (The State University of New York, Korea (Korea, (Republic of)) |
| Technical Report  [*Approved at the fourth FG-MV meeting*] | Embedding safety standards and the user control of Personally Identifiable Information (PII) in the development of the metaverse | Jan EISSFELDT (Wikimedia Foundation) Sarah Nicole  (Project Liberty Institute)  Neha VIJAY (Radix) |
| Technical Report | Considering online and offline implications in efforts to build confidence and security in the metaverse | Radia FUNNA (Build n Blaze) Araba Sey (Research ICT Africa, South Africa) Wendy Teresa Goico Campagna (Permanent Mission of the Dominican Republic to the United Nations and Other International Organizations in Geneva) |
| **TG-child online protection** | Chair:   * Mr Muhammad Khurram KHAN (King Saud University, Kingdom of Saudi Arabia) |  | Technical Report  [*Approved at the fourth FG-MV meeting*] | Responsible use of AI for child protection in the metaverse | Muhammad Khurram KHAN (King Saud University, Kingdom of Saudi Arabia)  Zaheema IQBAL (Global Foundation for Cyber Studies and Research)  Paul GRAINGER (University College London)  Farhan KHAN (Metaronical) |
| Technical Report  [*Approved at the fourth FG-MV meeting*] | Children age verification in the metaverse | Yazeed ALABDULKARI Muath ALDUHISHY Bushra ALAHMADI Louai ALARABI  (SITE, Kingdom of Saudi Arabia) |
| Technical Report | Extended reality and children: key issues and recommendations for government stakeholders, including policymakers and regulators, and technology companies | Afrooz Kaviani JOHNSON  Steven VOSLOO Hlekiwe KACHALI (UNICEF) |
| ​**TG-issues on trustworthiness related to the metaverse** | ​Chair:   * Mr Gyu Myoung LEE (KAIST)​ | ​ | ​Technical Report | ​Trustworthy metaverse | ​ Gyu Myoung LEE (KAIST)  Woojoo PARK (ETRI (Republic of))  Xiaojia SONG (China Mobile)  Xiongwei JIA (China Unicom) |
| ​ Technical Report | The framework of building a trustworthy digital human | Naying HU (CAICT, China)  Sumin GUO (Beijing Normal University, China) |
| Technical Report | Guidelines on trusted data use in building a trustworthy metaverse | Xiaoshuang JIA Xiaomi AN  Jinfa Li  (Renmin University of China)  Gyu Myoung LEE  (KAIST)  Meijie ZHANG  (Beijing Wuzi University) |
| **WG 7** | **Economic, regulatory & competition aspects** | Co-Chairs:   * ​​Mr Andrey PEREZ (Anatel, Brazil) * Mr Okan GERAY (Digital Dubai, UAE)   Vice-Chair:   * ​Mr Ahmed SAID (Egypt) | * 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 | Technical Specification | Economic value creation and competition in metaverse | Okan GERAY (Digital Dubai, UAE) |
| Technical Report  [*Approved at the fourth FG-MV meeting*] | Regulatory and economic aspects in the metaverse: Data protection-related | Ahmed SAID (MCIT, Egypt)  Hedaia NABIL (MCIT, Egypt) |
| Technical Report  [*Approved at the third FG-MV meeting*] | Policy and regulation challenges of the metaverse | Andrey PEREZ (Anatel, Brazil) Okan GERAY (Digital Dubai, UAE) |
| **​WG 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) | * 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 |  |  |  |
| **TG-sustainability** | Chair:   * ​ Ms Shuguang QI (CAICT, China)​ | * Use cases, requirements, and technical solutions related to climate changes and environmental sustainability | Technical Specification | Guidance on green and low carbon development of metaverse | Shuguang QI (CAICT, China) |
| Technical Specification | Methodology on assessment of GHG emissions of metaverse | Shuguang QI, Mengdi WANG (CAICT, China)  Jean Manuel CANET (Orange) |
| **TG-accessibility & inclusion** | ​Co-Chairs:   * Ms Paola CECCHI-DIMEGLIO (Harvard University) * Mr Yong Jick LEE (Center for Accessible ICT, Korea (Republic of))   ​ | * Use cases, requirements, and technical solutions related to accessibility | Technical Specification  [*Approved at the fourth FG-MV meeting*] | Accessibility requirements for metaverse services supporting IoT | Yong Jick LEE (Center for Accessible ICT, Korea (Republic of))  Hark SOHN (SCE Korea, Inc., Korea (Republic of))  Jee-In KIM (Konkuk University, Korea (Republic of)) |
| Technical Report  [*Approved at the fourth FG-MV meeting*] | Guidelines and requirements on interpreting in the metaverse | Binhua WANG (University of Leeds)  Yong Jick LEE (Center for Accessible ICT, Rep. of Korea)  Fei GAO (Chongqing University of Posts and Communications)  Lihong PAN (University of Leeds) |
| Technical Report  [*Approved at the third FG-MV meeting*] | Guidelines to assess inclusion and accessibility in metaverse standards development | Gayoung PARK (The State University of New York, Korea (Republic of))  Neal DREAMSON (The State University of New York, Korea (Republic of)) |
| Technical Specification  [*Approved at the third FG-MV meeting*] | Requirements of accessible products and services in the metaverse: Part I – System design perspective | Estella ONCINS (UAB, Spain)  Carlo EUGENI (University of Leeds)  Anna Matamala (UAB, Spain) |
| Technical Specification  [*Approved at the third FG-MV meeting*] | Requirements of accessible products and services in the metaverse: Part II – User perspective | Estella ONCINS (UAB, Spain)  Carlo EUGENI (University of Leeds)  Anna Matamala (UAB, Spain) |
| Technical Report  [*Approved at the fourth FG-MV meeting*] | Accessibility for a sustainable metaverse | Sarah Anne MCDONAGH (UAB, Spain) |
| Technical Report  [*Approved at the fourth FG-MV meeting*] | Guidance on how to build a metaverse for all: Part I – Legal framework | Christina Yan ZHANG (The Metaverse Institute)  Pilar ORERO (UAB, Spain) |
| Technical Report | Guidance on how to build a metaverse for all: Part II | Christina Yan ZHANG (The Metaverse Institute)  Pilar ORERO (UAB, Spain) |
| Technical Specification | Use of metaverse as a mitigation strategy for people with cognitive development difficulties in flood regions | Ashwini SATHNUR (Zero Hunger Champion) |
| Technical Specification | Requirements for communication between human-avatar languages in the metaverse | Pilar PRERO (UAB, Spain) Rahel LUDER, Louis AMARA (SwissTxt) |
| **TG-sustainable metaverse design​** | Chair:   * Ms Daniela TULONE (CNIT, Italy) |  | Technical Specification  [*Approved at the third FG-MV meeting*] | Design criteria and technical requirements for sustainable metaverse ecosystems | Daniela TULONE (CNIT, Italy)  Antonio PULIAFITO (CINI, Italy)  Gustavo MARFIA (University of Bologna, Italy) |
| Technical Specification | Incentive strategies to boost high-impact sustainable metaverse applications | Daniela TULONE (CNIT, Italy)  Antonio PULIAFITO (CINI, Italy)  Gustavo MARFIA (University of Bologna, Italy) |
| Technical Specification | Metrics and indicators to drive the design of sustainable metaverse applications | Daniela TULONE (CNIT, Italy)  Antonio PULIAFITO (CINI, Italy)  Gustavo MARFIA (University of Bologna, Italy) |
| **TG-metaverse social safety** | Chair:   * Ms Gabrielle PANTERA (Heroic Robots) |  | Technical Report | Metaverse social safety: mitigating harassment in the metaverse | Gabrielle PANTERA (Heroic Robots) |
| **WG9** | **Collaboration** | Co-Chairs:   * ​​Ms Stella KIPSAITA (Communications Authority, Kenya) * Mr Ziqin SANG (CICT, China) | * 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 | Technical Report | Standardization roadmap for metaverse | Ziqin SANG (CICT, China)  Hao WU (CICT, China) |
| **TG-gap analysis** | Co-Chairs:   * ​​Mr Leonidas ANTHOPOULOS (University of Thessaly, Greece) * Ms Jungha HONG (ETRI, Korea (Republic of))​ |  | Technical ​Report | Gap analysis on metaverse standardization | Leonidas ANTHOPOULOS (University of Thessaly, Greece)  Jungha HONG (ETRI, Korea (Republic of))​ |

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