Volumetric Media Interoperability
Working Group Charter

1. Status and Change History

05 March 2024 – Initial draft for exploratory group discussions.

08 March 2024 – Updated missing sections as discussed during VMI EG call #2, conversion into markdown.

22 March 2024 - Updated based on discussion and proposed pull requests in VMI EG call #3.

03 May 2024 - Clarifications on volumetric media definition and representation formats, as discussed in VMI EG call #6.

2. Officers

Lauri Ilola, Nokia

Bart Kroon, Philips

Ralf Schaefer, InterDigital

Céline Guede, InterDigital

3. Motivation and Goals (and NON-Goals)

Opportunities for more immersive services are increasing as volume capturing and rendering devices become more readily available. Metaverse in its own right is driving the demand for volumetric media as 2D experiences need to move into a more immersive domain. As a result, more technologies are being developed to address the requirements for compressing, storing, and delivering volumetric media. Multiple SDOs (e.g. 5G-MAG, 3GPP, MPEG, VFA, SVTA, DVB, SBTVD, etc.) have established isolated focus or study groups to solve issues affecting volumetric media services. To realize the potential of the metaverse and allow volumetric services to play a role in it, it is essential to learn more of the ongoing activities and to identify opportunities for collaboration and interoperability.

Because of the wide-spread interest and isolated initiatives, the volumetric media ecosystem is becoming fragmented. Building understanding on various volumetric media solutions would be beneficial for the industry to try and identify possible interoperability points between different systems or contribute to harmonizing them.

Establishing a platform for facilitating the discussion between multiple SDOs and industry forums as well as working on identifying and solving interoperability issues would help accelerate adoption of volumetric media services. Many puzzle pieces have to be in place for volumetric media to become mainstream, and the industry will win more from working together than from working out proprietary solutions.

3.1 Definition of volumetric media

Volumetric media is a technology which enables capture of an object or scene in three dimensions and its playback independent from the original capture position(s) or orientation(s).

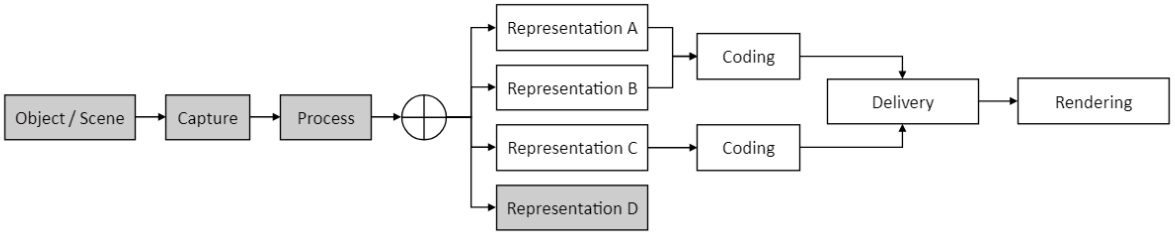
Volumetric video is the video form of volumetric media, sometimes also called immersive video, 6DoF video, or spatial video.

Volumetric audio is the audio form of volumetric media, sometimes also called immersive audio, or 6DoF audio.

3.2 Scope of the working group

Where 2D video lives on a plane, volumetric video bridges the gap between 2D video and 3D graphics by bringing video element(s) into a 3D environment. Metaverse applications are expected to combine volumetric media with 3D graphics and haptics. The insertion of natural content makes metaverse experiences more realistic and trustworthy. When a user interacts with the scene then the volumetric media behave in a way that is consistent with the graphical and haptical elements.

The figure below intends to illustrate the context of the work in the group. Where volumetric media originates from and how it is captured and processed into various representation formats is out of scope. The scope of the group would include studying representation formats and coding tools. Multiple volunteers should commit to interoperability testing for a given solution to be considered. Delivery aspects related to the content are considered in scope as it is necessary for exchanging coded representation formats. Interoperability of rendering is also in scope.



In the context of this domain working group, volumetric media solutions for consumer entertainment applications are considered. Overlap with other domain working groups or exploratory groups that are also studying the compatibility requirements, such as 3D Asset Interoperability using USD and glTF, 3D Web Interoperability, Interoperable Characters/Avatars and Digital Fashion Wearables for Avatars should be minimized.

This domain working group was established to build a better understanding of volumetric media, to identify relevant areas of applications and compatibility requirements, and to establish common requirements for different systems.

3.3 Primary Goals

- Build and share understanding on volumetric media by arranging learning sessions for various volumetric media coding and systems technologies.
- Explore and engage with existing initiatives and standards developing organizations which are working on volumetric media.
- Collaborate with 3D web interoperability domain working group to collect use cases and related requirements to better communicate to the industry where volumetric media can be useful.
- Document existing implementations and building blocks for volumetric media delivery.
- Define what type of volumetric media technologies should be focused on as part of the interoperability testing in the domain working group.
- Arrange interoperability test sessions or plug-fests among interested parties to identify gaps in system compatibility by collecting and sharing test vectors.
- Coordinate with other Domain Groups on technical aspects to ensure expectations from the volumetric media ecosystem are met and that overlapping work and efforts are avoided.

3.4 Secondary Goals

- Gather favorably licensed test and demo content that can be used to evaluate various volumetric media coding technologies.

- Explore possible format conversions between different technologies to identify gaps in the volumetric media ecosystem.
- Facilitate discussion on volume rendering technologies.

3.5 Non-goals

- No joint software development.

3.6 Representations and codecs

It depends on member support which volumetric media representations and codecs will be studied. Representations may include and are not limited to multi-view video (+depth), mesh sequences, voxel sequences and point cloud sequences. There are representations of current interest like neural radiance fields and 3D Gaussian splats that may be considered when a reasonable transmission format (codec) would be identified.

4. Project Deliverables and Requirements

- Publication of white papers for disseminating the findings of the Domain Working Group. The papers may target the following topics:
  - volumetric media definition,
  - use cases and requirements,
  - survey of existing coding and systems technologies,
  - documentation of interoperability gaps, and
  - documentation of identified issues.
- Workshops enabling a discussion platform for the volumetric media industry.
- Collection of test vectors for building blocks of volumetric media delivery pipeline.
- Contribute to conferences and trade shows to promote tested technologies and results.

5. Milestone Plan

- 6M (after WG establishment)
  - Cross SDO workshop on volumetric media
  - Define how to arrange interoperability testing – gather test content
- 12M
  - White paper / publication / blog - volumetric media definition
  - White paper / publication / blog - volumetric media use cases & requirements
  - Gathering results and observations from interoperability tests
- 18M
  - White paper / publication / blog - Survey of existing coding systems and technologies
  - White paper / publication / blog - Interoperability gaps and issues for volumetric video
- 24M
  - Re-evaluation of working group charter
- Per need
  - Contribution to conferences / trade shows / public discussion based on interoperability testing results and findings

6. Coordination

The group shall arrange two exploratory group calls per month to progress drafting of the charter. At least once per month seek to arrange volunteer-based educational sessions in combination with the regular calls.

The exploratory group aims to collaborate with companies with existing volumetric media coding solutions and relevant standards setting organizations. Potential list of collaboration candidates include:

- MPEG
- 5G-MAG

- 3GPP SA4
- VFA
- Streaming Video Technology Alliance (SVTA)
- DVB
- SBTVD
- Web3D Consortium and X3D standard
- 3D Web Interoperability Domain Group
- DICOM
- Health Level Seven International (HL7)

7. Communication Plan

Working Group Officers will provide quarterly updates to the Oversight Committee, and update to Forum membership twice a year (or per request). The Working Group will solicit external SDO representatives to present volumetric media technologies to the WG members.

8. Risk Factors

The largest risk factor is that the identified industry organizations are not interested in discussing interoperability of different solutions or initiatives. Individual companies offering volumetric media services may also lack resources to discuss solution compatibility.

9. Working Group Renewal

The Working Group charter will be valid for two years from the approval of the charter. Re-evaluation will be done by the Working Group and suggested amendments will be presented to the Oversight Committee for re-approval of the Working Group Charter.

10. Project Funding and Resources

The Working Group may request the Forum to cover fees resulting from the publication of white papers. The fees may include registration and publications fees for conferences and journals. The fees related to the travel of the authors (hotels, flights, visas, etc.) to present the white papers are not covered. Requests for funding will be submitted to the Forum Oversight Committee for approval case by case.

11. References