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**CODING OF MOVING PICTURES AND AUDIO**

**ISO/IEC JTC1/SC29/WG11 N17064**

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| **Source** | **Requirements** |
| **Status** | **Final** |
| **Title** | **Requirements for MPEG-I hybrid natural/synthetic scene data container (V.1)** |
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# Introduction

MPEG is currently developing a suite of specifications under the project umbrella of ISO/IEC 23090 “Coded Representation of Immersive Media”; informally called MPEG-I. The specifications in MPEG-I will support various types of immersive media, including media captured from the natural world (e.g. light fields), and media that is or can be created by computer generation methods, i.e. synthetic content.

Some of the use cases that have been identified as relevant to MPEG-I enable the ability for users to coherently interact with, and/or experience both natural and synthetic forms of media simultaneously in the form of a rendered visual and/or audio scene. These use cases include: cinematic visual effects, mixed-reality telepresence, and virtual games among others. Any of these identified use cases can leverage a mixture of both natural and synthetic media objects for the scene, i.e. *hybrid* scene data.

In order to enable the ability for industry to broadly interchange such digital media, including entirely captured natural data, entirely synthetic data, and any mix of these forms of data for rendering as a scene, MPEG anticipates that it will need to standardise a container format for a scene graph representation. Requirements for such a scene graph representation and container format are identified in the following section.

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# Requirements

1. Scene Graph
   1. The representation shall support additional information for evaluation by a renderer in order to output raster data (image and videos) and volumetric (point clouds, meshes, arrays of voxels, reflectance fields).
   2. The representation shall support sub-graph representation that allows modular rendering.
   3. The representation shall support composition of digital representations of natural objects and CGI content.
   4. The representation shall support synchronisation between objects and attributes in the scene.
   5. The representation shall support scripting language for operation in the scene graph.
   6. The representation shall support attributes in order to implement natural laws of light, energy propagation and physical kinematic operations.
   7. The representation shall support resolvable references to all data types stored in the same local source data container as the serialized scene graph loaded by the renderer.
   8. The representation shall support resolvable references to all parts of the scene graph, namely the scene graph can be stored in multiple files.
2. Synthetic content
   1. The representation shall provide volumetric representation of computer generated objects and scene elements.
   2. The representation shall provide mathematical representation of computer generated object and scene elements.
   3. The representation shall provide parametric representation of computer generated objects and scene elements.
   4. The representation shall support raster data representation for synthetic content.
   5. The representation shall support procedural functions for computer generated objects.
   6. The representation shall support procedural parameters to synthesize audio content.
3. Captured natural content
   1. The representation shall support references to recorded audio.
   2. The representation shall support references to raster data images and video.
   3. The representation shall support references to volumetric audio and visual data.
4. Compression
   1. The representation shall support compressed data formats: raster (image and video), and volumetric (mesh, point cloud, reflectance field, array of voxels) data compression.
   2. The representation shall support compressed audio.
5. Container
   1. The representation shall support compressed and uncompressed cinematic open source formats: EXR (raster), Alembic (mesh), OpenVDB (point cloud).
   2. The representation shall support a mechanism to add additional formats.