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| **Title** | **Exploration Experiments for MPEG-I Scene Description** |
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1. **EE1: Carriage of Random Access Support in Scene Description (closed)**

EE closed at MPEG #137. Please see WG03 N00383 for the latest description of this EE.

1. **EE2: Dynamic Scene Update (closed)**

EE closed at MPEG #137. Please see WG03 N00383 for the latest description of this EE.

1. **EE3: Codec Support in MPEG-I SD (closed)**

EE closed at MPEG #140. Please see WG03 N00613 for the latest description of this EE.

1. **EE4: Haptics Support** **(closed)**

EE closed at MPEG #139. Please see WG03 N0540 for the latest description of this EE.

1. **EE5: Generic Interactivity Framework (closed)**

EE closed at MPEG #139. Please see WG03 N0540 for the latest description of this EE.

1. **EE6: User Representation and Avatars (closed)**

EE closed at MPEG #141. Please see WG03 N0687 for the latest description of this EE.

1. **EE7: AR Anchoring (closed)**

EE closed at MPEG #139. Please see WG03 N0540 for the latest description of this EE.

1. **EE8: Lighting (closed)**

EE closed at MPEG #143. Please see WG03 N0983 for the latest description of this EE.

1. **EE9: Support of Shared Experiences using MPEG-I Scene Description**
   1. **Introduction**

During the Rennes meeting (m67738r2), it has been agreed to address multi-user interactivity in the next amendment of the MPEG-SD 2nd edition document.

One topic was the support of MPEG-I requirements for multi-users & social VR, and the integration of the MPEG animated avatar which include:

|  |  |  |
| --- | --- | --- |
| Multi-User Interactivity | | |
| 95 | The specification shall enable multi-user immersive applications in which several users are experiencing the same immersive experience together. | Not completed yet, To be addressed in phase 3 |
| 95.1 | It shall be possible to detect & render interactions between users within the immersive environment. | Not completed yet, To be addressed in phase 3 |

* 1. **Problem statement**

Shared experience refers to the case that multiple users, each of them consuming a scene description, collaborate and interact in a scene and the actions of one user impacts the scene rendering of another user. The challenge lies in maintaining a coherent experience amongst all the users, notably to support applications that do not have a complex and sophisticated framework for addressing colluding interactions. That is where come the concept of centralized scene management module, that maintains the states of the scene and, depending on users input, generate and send scene updates to the users.

At runtime, a call flow for such a shared experience could be similar to the one described for an AR call session, in the 3GPP 26.264 specifications ([2], annex A), given in the following figure.



Figure 2: Scene description processing in a multi-users environment

The MR/MFR entity act as the centralized scene manager that generates (3) and maintains a scene description and share it (4) with the connected UEs. This scene description may include the description of behaviors as specified by the MPEG-SD interactivity extensions and some of them may be related to triggers involving several users. A behavior specifies a set of triggers that are activates upon the occurrence of event like collision or proximity between objects of the scene, visibility of some objects or user input. Once activate, some actions, also defined in the scene description) are executed and it may modify the scene.

In the above call flow, at runtime, each UE sends its user input and pose to the scene manager. The scene manager fetches the behaviors specified in the scene description and for each trigger that is activated, execute the related actions. If that leads to modification in the scene description, the scene manager generates the corresponding scene update and send it to the UEs.

Those triggers have been specified in a mono-user context and the goal of this EE is to check if they are sufficient in a multi-user environment.

* 1. **Use cases relevant for the EE**

The work will be based on several use cases.

2 use cases have already been discussed during the mpeg148 meeting:

* An AR call session, where several users meet in a virtual conference. This use case is described in the m70204 contribution.
* A multiplayer game where multiple players interact simultaneously in a shared gaming space. This use case is described in the m70588 contribution.

A first step will be to agree on those being relevant for the EE, and new use cases may be provided.

* 1. **Mandates**

The mandates for this EE are as follows:

* To provide and study a set of use cases relevant to this EE
* Investigate whether extensions are needed at the scene description format level to support the selected use cases.
  1. **Participants**

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(P = proponent, L = leader)

* 1. **Timeline**
  2. **References**

1. Text of ISO/IEC FDIS 23090-14 2nd edition Scene description, April 2024
2. 3GPP TS26.264 IMS-based AR Real-Time Communication (<https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=4101>)