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**CODING OF MOVING PICTURES AND AUDIO**

**ISO/IEC JTC 1/SC 29/WG 3 N** **0428**

**Online – October 2021**

# Summary

This document provides and initial summary of the joint workshop between MPEG, Khronos and 3GPP. MPEG and The Khronos Group hosted a joint workshop on Streamed Media in Immersive Scene Descriptions. The primary purpose of the workshop was the exchange of information on developments in MPEG that relate to Khronos specifications, primarily glTF 2.0, and to seek feedback on the approaches taken. In addition, the workshop aims to identify additional synergies and opportunities for cooperation regarding Khronos standard APIs for GPU processing and XR runtime APIs, MPEG’s work on digital representation of digital media, and 3GPP’s 5G-based advanced delivery of media.

Thanks to everyone for participating in the Joint Workshop of MPEG/Khronos/3GPP. Special thanks want to co-hosts: Neil Trevett (Khronos president) and Frederic Gabin (3GPP SA4 chair) as well as all speakers for excellent presentations and answering all questions.

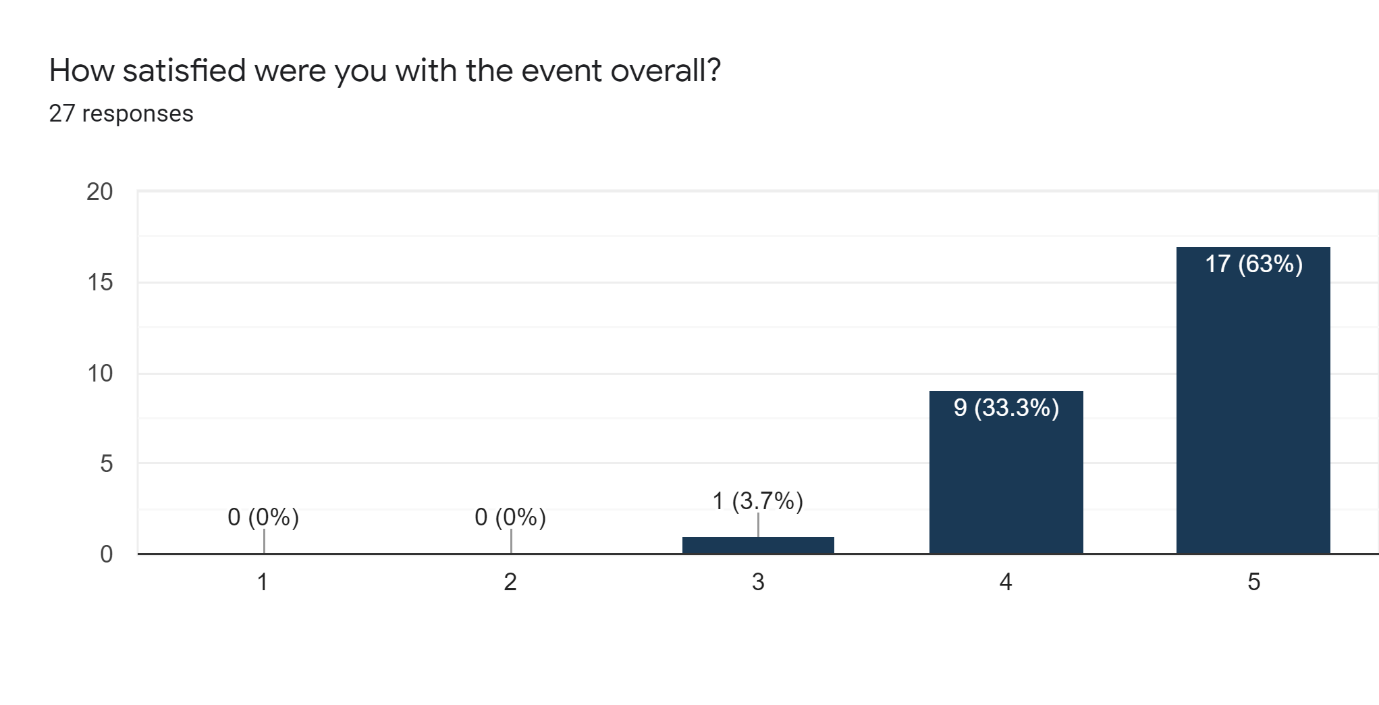
Minutes and all slide sets as well recording of days 2 in the online minutes [here](https://docs.google.com/document/d/10wrBrc0Dt1pVcpRquSjd7lJrsy_OII-GhyjWASalqlM/edit?usp=sharing), but also attached to this document (except recording)

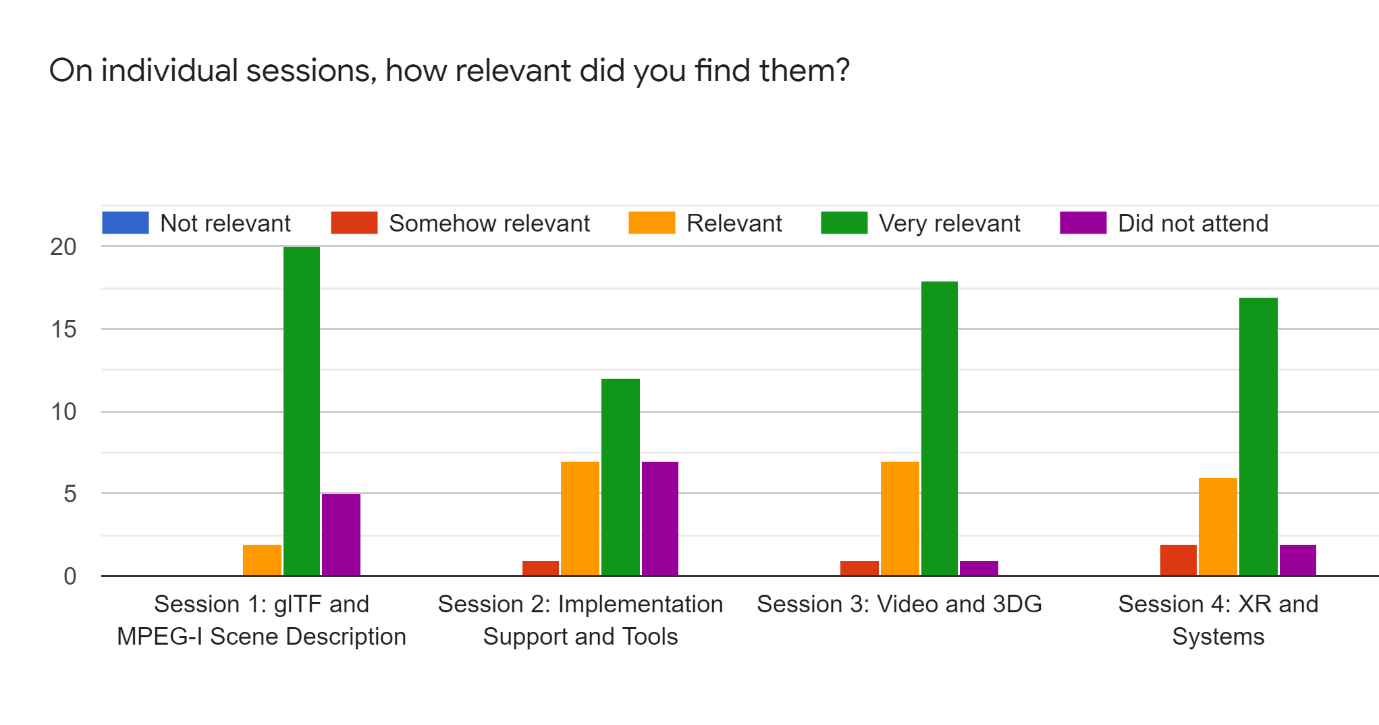
Here is an initial draft summary of the observations

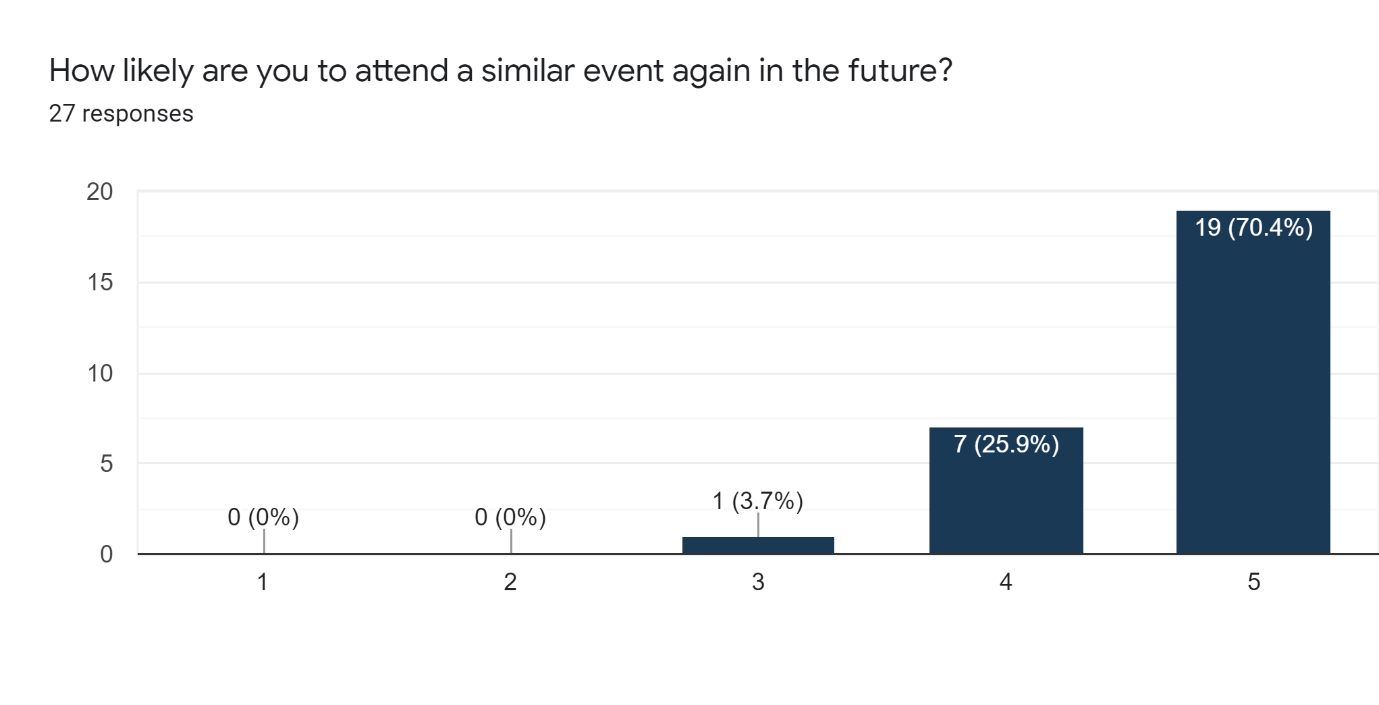
* Complementary work – many touch points - collaboration seems to be beneficial
* Specific topics identified, but may be digested further
  + glTF and extensions by MPEG-I Scene description
  + Tools and implementation support
  + Vulkan Video and VDI
  + Extended Realities: OpenXR, MPEG-I Phase 2 incl. AR, Interactivity and Haptics
  + Systems and Split Rendering: OpenXR, 3GPP connectivity, MPEG codecs
* Challenges: Timelines, publication rules, IPR policies, membership
* Opportunities: complementary expertise, implementation and developer support, joint promotion, focus
* Proposed next steps:
  + continue the discussion
  + set up some kind of discussion platform

# Survey

A survey was conducted and the feedback is attached. A summary of the responses is provided below.







What would you like to see changed for such a follow-up event?13 responses

I found transition between sessions unclear

The format was really appropriate for information sharing. In future events, it might be useful to incorporate some structured discussions or specific follow-on action points.

joint sessions on specific questions

Panel discussions and more opportunities to ask questions.

Perhaps a little more time for some of the topics. Some of the presentations were rushed, while others were quite long. Hopefully, next meeting can be in person.

Maybe a bit more of time buffer to let open discussions after presentations.

More talks from companies with commercial services.

Organization is fine. However, sharing meeting materials using google drive makes access from corporate network complicated.

More Q&A time after each topic would help.

It would be great to break off into smaller groups to talk specifics

Maybe a bit more slack between sessions to allow for just a bit more discussion.

More time for discussions

It would be interegins elaborate/voted chanllages or research questions to be pursued by professor/students.

Any ideas on what topics should Khronos work on in 2022+?8 responses

OpenXR extension/update to support distributed application/architecture (accurate timing,...)

Interactivity is a key component of immersive media experiences.

I look forward to the OpenXR work progressing. No specific ideas on new topics.

Continue on OpenXR

- Keep spreading and extend glTF capabilities and integration in XR systems. - 6DoF Standards ?

More light models for glTF

I would love to see streaming geometry and textures to support LOD handling

Support for adaptive streaming

Any ideas on what topics should MPEG work on in 2022+?8 responses

XR related data transport protocol other than video or point cloud (XR poses, actions, events, ...)

Coding for interactive presentation.

Look forward to the second edition of MPEG-I SD. The integration of immersive audio and haptics into SD is crucial to ensure a truly immersive media standard that is reflective or real-world use cases.

Integration of Audio and Systems Scene Graph

Volumetric streaming (e.g high-res D-Mesh representations).

Phase 2 of SD and partial access in MAF

I would love to see streaming geometry and textures to support LOD handling

Adaptive streaming of immersive content defined by Scene Descriptions, with assistance from Cloud/Edge computing.

Any ideas what topics should 3GPP work on in 2022+?7 responses

synchronization of various type of data in XR context, generated from distinct devices in a distributed architecture (edge computing, split computing)

Latency and edge cases supporting interactivity and AR specific standards.

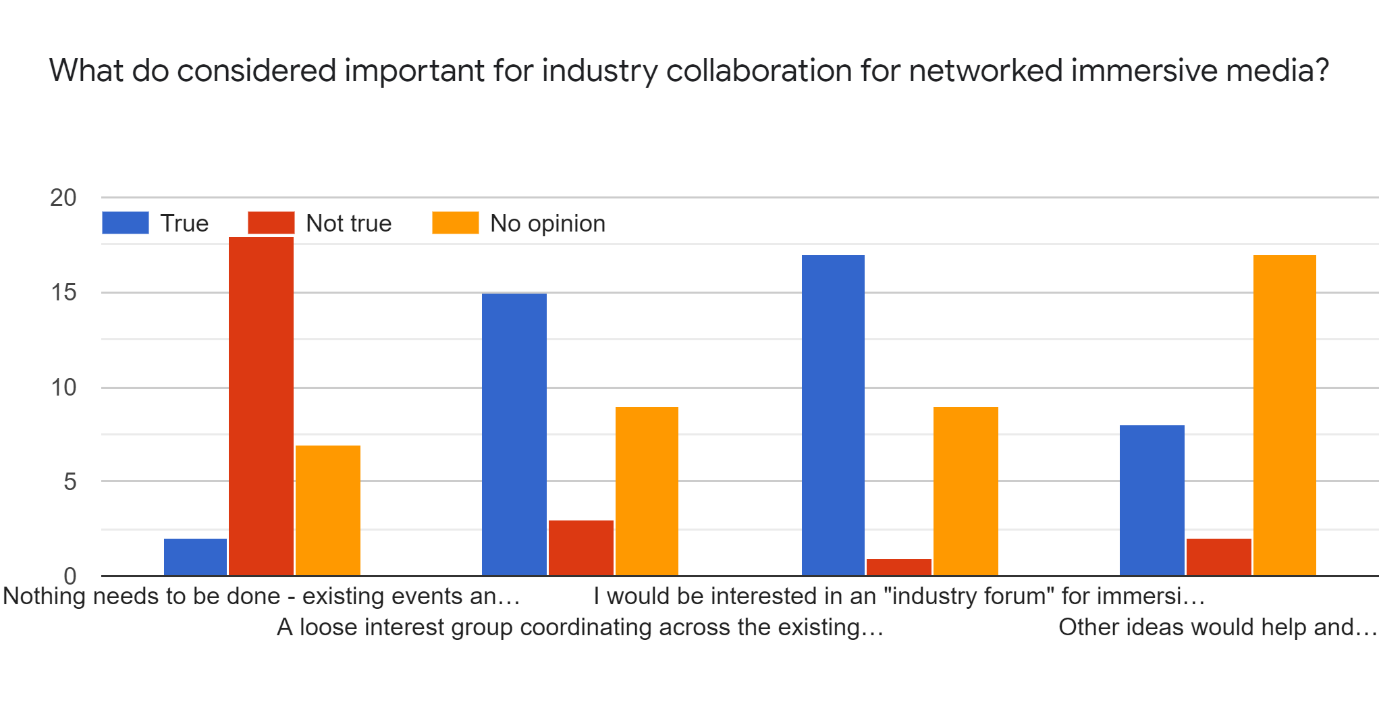
:-)

No opinion.

Study XR standards interoperability on 5G ecosystems and infrastructures.

edge enablement

split rendering and edge computing in 5/6-G networks



Comments or other ideas on collaboration7 responses

some XR use cases oriented hackathon shared amongst interested companies

I am involved in a collaboration aiming to bring together academia and industry interest in data driving broadcast and media services (DataTV, we have held workshops at ACM IMX conferences)

A bi-annual version of this event seems like a good alignment point.

It would be helpful to have a common discussion forum; such as a slack channel, google group; where an exchange of information can happen between the different organisations.

Periodic sync-up meetings between MPEG, Khronos, and 3GPP in this area would be very helpful. Liaisons statements help, but such workshop interactions are a lot more useful.

VRIF is an example of industry forum intending to work on interop and promotion of immersive media standards but is lacking of members and contributors.

Khronos/MPEG should also help plan dedicated meetings for smaller groups interested in focused discussion on specific topics as a follow-up to general Workshop (which was very useful!).

Any final overall feedback on the event? Goods and Bads?15 responses

It was well organized and pleasant event.

good timing and duration of each topics

Very well organised

The 2nd day was a bit rushed, it might make sense to have a bit more time in the future.

Very good. Bravo Thomas and Neil!

Brilliant!

Thanks for doing this! Very useful and informative. Smoothly conducted!

Thanks to Thomas Stockhammer for his excellent work as organizer and moderator.

Very interesting and in-depth content.

# Next Steps

It is agreed to take into account the feedback from the workshop in the future work of MPEG and in the collaboration with other organizations.

Members are invited to provide additional feedback on what to do with the collected information.