International Cooperation for an Interoperable Metaverse

WAIC, Shanghai, July 2023

Neil Trevett
Metaverse Standards Forum, President
NVIDIA, VP Developer Ecosystems
Khronos, President
ntrevett@nvidia.com
Metaverse will be Built on Interoperability Standards

The metaverse combines the connectivity of the Web with the immersiveness of Spatial Computing through enabling multiple disruptive technologies to work together (AI, GPU, XR, Web3, 5G+).

Building bridges between applications to scale beyond a series of disconnected silos

Depends on Interoperability

Evolving a platform that is open and inclusive for all – an immersive evolution of the web

Pervasive metaverse interoperability will need a constellation of open standards ...

... involving 100s of standards organizations

A unique venue for cooperation between standards organizations and with the wider industry

© Metaverse Standards Forum 2023
This work is licensed under a Creative Commons Attribution 4.0 International License
Effective Standards for the Metaverse – Sooner!

- The Forum aims to assist and **accelerate development of metaverse standards by its Members**
  - The Forum does not create standards itself!

- A neutral and welcoming venue for all standards organizations and companies to cooperate
  - Open to any organization, free membership tiers, no NDA, no patent licensing obligations

- Pragmatic, active and agile – strongly connected to industry activities
  - Multiple Forum meetings happening almost daily
The metaverse is driving significantly increased interest in interoperability standards!

Khronos recognized the need for broad cooperation to avoid duplication, eliminate gaps, and gather use cases and requirements to inform and assist standardization activities

Khronos successfully executed the transition to incorporate the Forum as an independent consortium in April 2023

Khronos launches the Forum in bootstrap mode to quickly start cooperative work while determining industry interest

37 Founding Companies including Meta, Microsoft, NVIDIA, Epic, Unity, Adobe, Autodesk

The Forum grows to over 2500 Member organizations

Multiple Domain Working Groups working to improve interoperability one project at a time

June 2022

End 2022

April 2023
2500 Global Members and Counting...

Wide diversity of organizations, including...

Standards Organizations
Khronos, W3C, Open Geospatial Consortium, IEEE, OMI, ASWF, Spatial Web Foundation, VRM Consortium, XRSI, OMG, Open AR Cloud, OMA3 ...

Platforms
Meta, Microsoft, Sony, Google, Baidu, Huawei, General Motors, RedHat, Siemens, Tencent, Mozilla, Paramount ...

Tools and Engines
Epic, Unity, Adobe, Autodesk, Ottoy, Maxon, Cesium, ESRI, Blackshark.ai, Croquet, Lamina1, Niantic, Ready Player Me, DGG, Manticore ...

XR
HTC, Magic Leap, Nreal, Panasonic, Tobii, 2Space ...

Hardware
NVIDIA, Intel, AMD, HP, Acer, Dell, Qualcomm, Samsung, Sony, MediaTek, Oppo, Lenovo, ZTE, LG ...

Wireless and Networking
China Telecom, Deutsche Telekom, T-Mobile, Verizon, NTT, AT&T, Telefónica, Juniper, Comcast ...

3D Commerce
Alibaba, Alvanon, Avataar, CLO, Browzwear, IKEA, VNTANA, Metaverse Fashion Council, Target, Wayfair ...

Universities and Institutes
Stanford, John Hopkins, Yale (XRP), Queens University Belfast, University Salford, New York Institute Technology, APMG ...

Advocacy
XRSI, AREA, XR Association, VRAR Association, XR Guild, Web3 Marketing Association, International Virtual Reality Healthcare, Swiss Institute for Disruptive Innovation, IOT Consortium, Metaverse Japan, RIAA ...

Global participation gathers diverse requirements and expertise

Strong industry involvement drives pragmatic projects and deliverables
Organizing for Effective Forum Action

1. Gather standardization topics of interest from all members

   Actionable interoperability problems and opportunities

   Over 200 topics suggested and counting, for example..

   Database of metaverse standards
   Taking 3D assets between worlds
   Asset LODs
   glTF / USD interoperability
   Avatar customization / animation
   3D Apparel and Fashion
   Cloth Simulation
   Metaverse traversal
   Geospatial ontologies
   Geospatial streaming
   Decentralized User ID
   Ethical framework
   User privacy
   Child safety
   Payment frameworks
   Etc. etc..

2. Organize Topics into Domains

   Member voting on where the Forum can best add industry value

   Member-prioritized Domain List
   - Privacy, Safety, Security, Inclusion
   - Interoperable 3D Assets
   - Real/Virtual World Integration
   - Identity (was User Identity)
   - Avatars and Apparel
   - Teaching, Education, Certification
   - Metaverse Standards Register
   - XR and UI
   - Metaverse Definition
   - Networking
   - Geospatial
   - Payments and Economy
   - Runtimes and Object Model
   - Governance and Advocacy
   - Video Broadcasting and Meetings
   - Forum Outreach
   - Tooling and Creators
   - Gaming
   - Health and Medical
   - Performance and Scalability
   - Business Analytics

3. Create Domain Groups

   Execute projects to create public work products

   Focus on pragmatic focused projects to create a wavefront of immediate business opportunities
   - Video presentation libraries
   - Domain and technical reports
   - Use case & requirements matrices
   - Best practices and guidelines
   - Pilots, testbeds and plugfests
   - Test assets, interoperability testing data and insights
   - Open-source tooling
   - Etc.
Forum Domain Group Pipeline

Metaverse Standards Register
Publicly available database mapping the landscape of metaverse-relevant standardization activities

glTF/USD 3D Asset Interoperability (visuals, behaviors)
Cooperation between USD and glTF to increase synergy and reduce duplication of effort, gaps, fragmentation and industry confusion

Asset Management (web3, protection, digital rights)
Digital rights, protection, portability, access, availability

Real/Virtual World Integration (digital twins, IOT)
Constructs to describe and integrate the physical world and created representations

Network Requirements and Capabilities to Support Metaverse Applications
Industry requirements for seamlessly transitioning traffic on multiple wireline and wireless technologies for deploying metaverse applications at scale

Interoperable Avatars
Cross-platform avatars and characters for film, gaming, fashion and social platforms

Digital Fashion/Wearables
Clothing (including layering), shoes, hats, accessories

Privacy, Cybersecurity & Identity
Recommendations for responsible innovation that mitigates human and societal harm from objective and subjective privacy risks – including cybersecurity and identity risk management

Technical Interoperability and End-User Troubleshooting
Enabling end-users to ensure reliable metaverse experiences

3D Web Interoperability
Enable the broadest possible interoperability of Metaverse Content using the Web

Ownership and Identity
Accessibility
Best Practices for Living and Working in the Metaverse
Academia & Research and the Metaverse
Ethical principles for the metaverse and their implementation
The Industrial Metaverse

Any Forum member can propose and participate in Domain Groups
There are often multiple Domain Group meetings each day

Key
Working Groups
Exploratory Groups
Exploratory Group Proposals

Forum Domain Group activities
https://metaverse-standards.org/domain-groups/
Forum Organization

- No NDA or IPR Framework is needed as the Forum is not a standards organization
  - All Forum-generated materials are made publicly available
- Participant Membership is free
  - Access to all Domain Group activities
- Principal Members oversee Forum priorities and operations
  - Participate in Oversight Committee and elected Forum Board of Directors
  - Membership fees from $50 to $10K
  - Principal dues are waived for standards-related organizations and non-profits

The Metaverse Standards Forum is an independent non-profit 501(c)(6) industry consortium that welcomes global participation
Metaverse Reality vs. Hype

<table>
<thead>
<tr>
<th>The Hype</th>
<th>The Reality</th>
</tr>
</thead>
<tbody>
<tr>
<td>You will need to plug into a VR headset to access the metaverse</td>
<td>Although VR will deliver some of the most immersive experiences and AR could eventually replace mobile phones, there will be many ways to use metaverse applications - including phones, tablets and PCs</td>
</tr>
<tr>
<td>We will live our lives isolated in a dystopian VR metaverse!</td>
<td>We will choose to use the metaverse when and if it is engaging, insightful and educational – and perhaps more productively than the average of 3 hours a day we on average spend watching TV today</td>
</tr>
<tr>
<td>The Metaverse will be a wild west of crypto currencies and NFT scams</td>
<td>Web3 is a young area of innovation – and is still evolving how to enable systems of decentralized trust for ID, reputation and economic transactions that will be essential to the metaverse</td>
</tr>
<tr>
<td>The Metaverse market will be worth <em>Trillions</em> of dollars $ in the next few years</td>
<td>As with many transformative technologies, its evolution will take longer than we think, but its impact will likely be larger than we first imagined</td>
</tr>
<tr>
<td>The Metaverse is dead!</td>
<td>Many over-associate ‘the metaverse’ with their favorite technology such as VR or NFTs, or the quarter-by-quarter actions of individual companies</td>
</tr>
</tbody>
</table>

Cooperative endeavors such as standards organizations and the Metaverse Standards Forum can provide the thread of continuity for industry forward progress as technologies, platforms and market positions – and hype cycles - swirl and evolve
A Unique Cooperative Opportunity

Broad global participation in the Forum provides a unique opportunity for metaverse standards cooperation, coordination and leadership for Forum members to accelerate their objectives.

Any Forum member can propose, lead, contribute to, participate in, or monitor Domain Working Groups.

Any company or organization is welcome to join the Forum! [https://metaverse-standards.org/](https://metaverse-standards.org/)