



Metaverse  
STANDARDS FORUM™

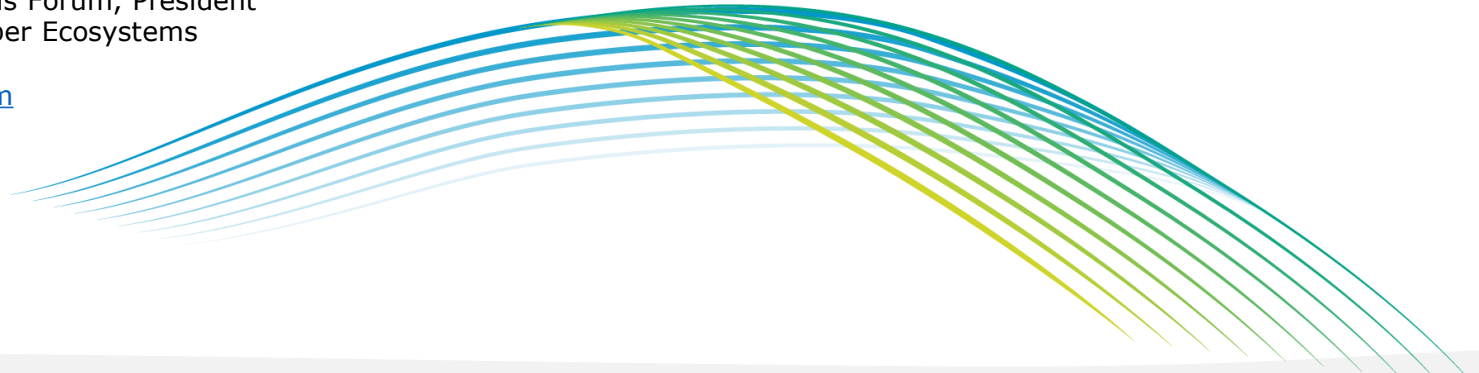
# Forum Update and Bringing the Metaverse to the Web



**SIGGRAPH 2023**  
LOS ANGELES+ 6-10 AUG

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# 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

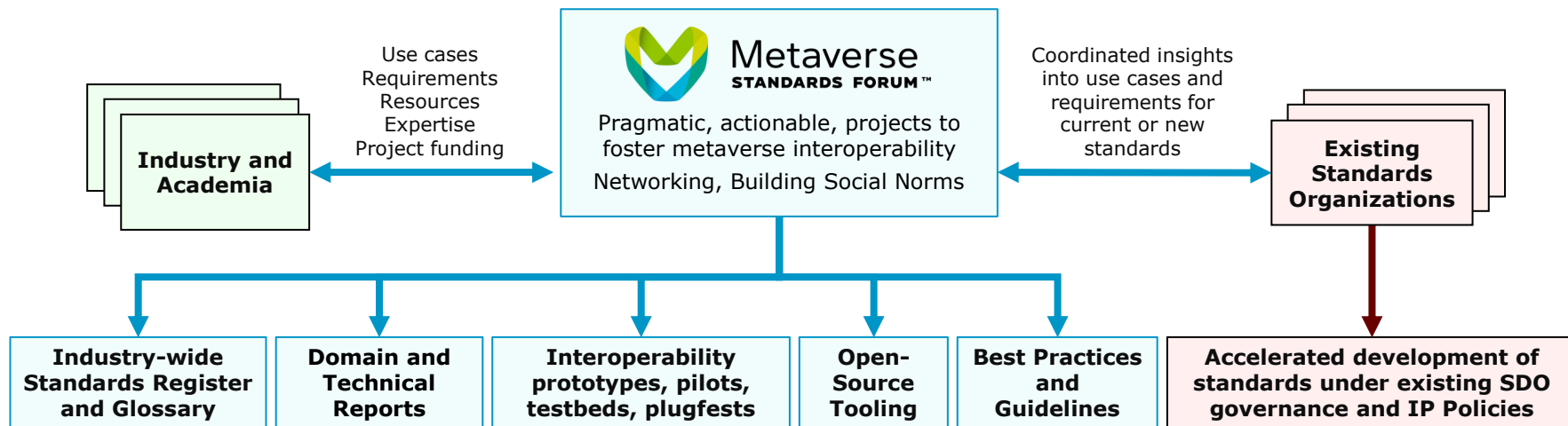


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# Effective Standards for the Metaverse – Sooner!

- 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



# 2500 Global Members and Counting...

**Wide diversity of organizations, including...**

## Standards Organizations

Khronos, W3C, Open Geospatial Consortium, IEEE, Web3D Consortium, 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, Otoy, Maxon, Cesium, ESRI, Blackshark.ai, Croquet, Lamina1, Niantic, Ready Player Me, DGG, Manticore ...

## XR

HTC, Magic Leap, Nreal, Panasonic, Tobii, zSpace ...

## 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**



**Any company or organization is welcome to join the Forum!**

<https://metaverse-standards.org/>



# 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  
gITF / 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

Continuously Evolving Pipeline

## Metaverse Standards Register

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

### gITF/USD 3D Asset Interoperability (visuals, behaviors)

Cooperation between USD and gITF 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

### 3D Web Interoperability

Enable the broadest possible interoperability of Metaverse Content using the Web

### 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

### 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

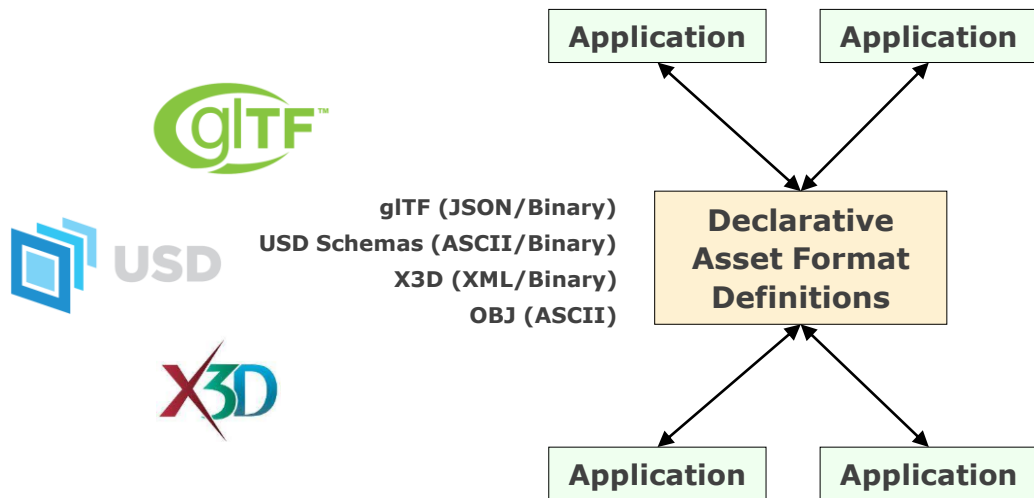
<https://metaverse-standards.org/domain-groups/>



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# 3D Asset Interoperability



**Asset Interoperability goes far beyond just the standardization on how to represent meshes, materials and animations**

**Aspects to consider when an asset is passed between worlds on the metaverse:**

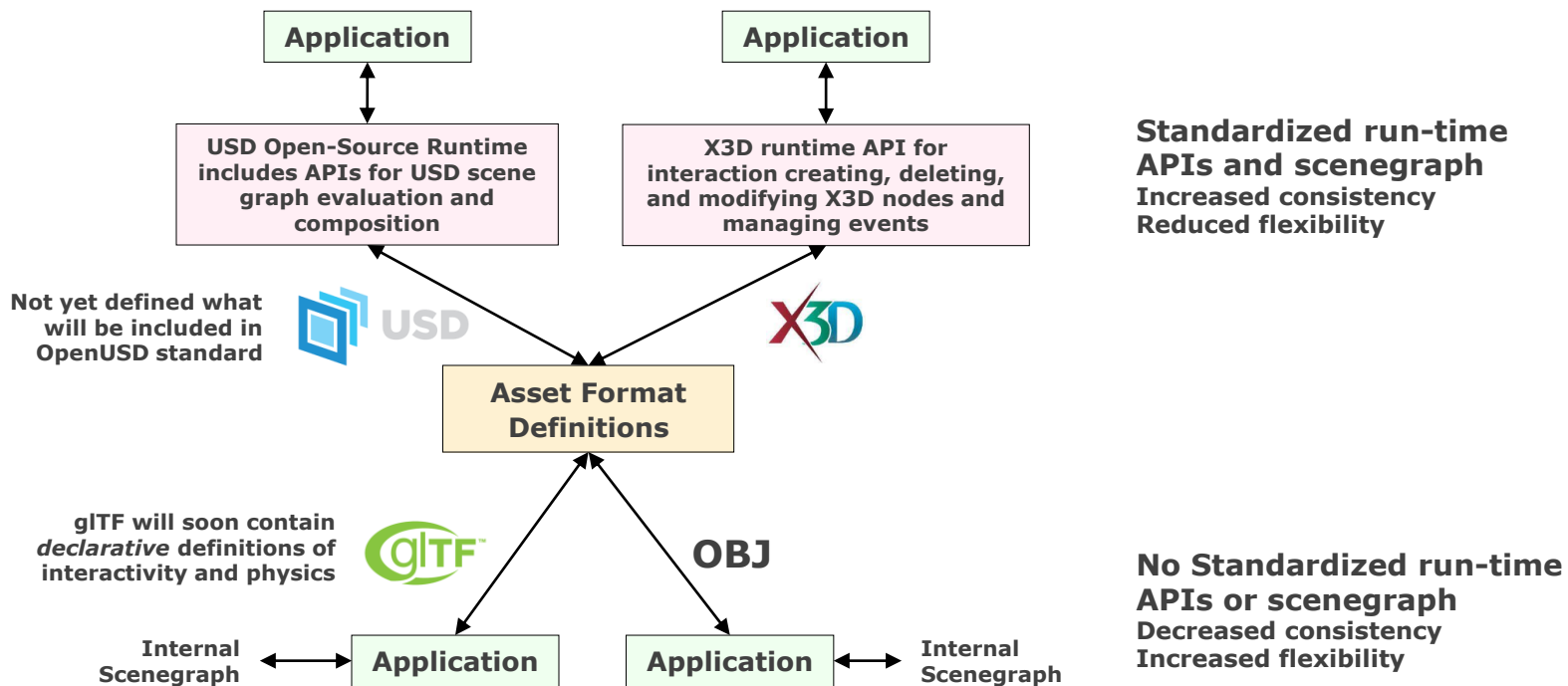
- Ownership**
- Transfer fees**
- IP Rights**
- Age appropriateness**
- Gameplay integrity**
- Aesthetic Styling**

....

**The metaverse will need virtual customs posts**

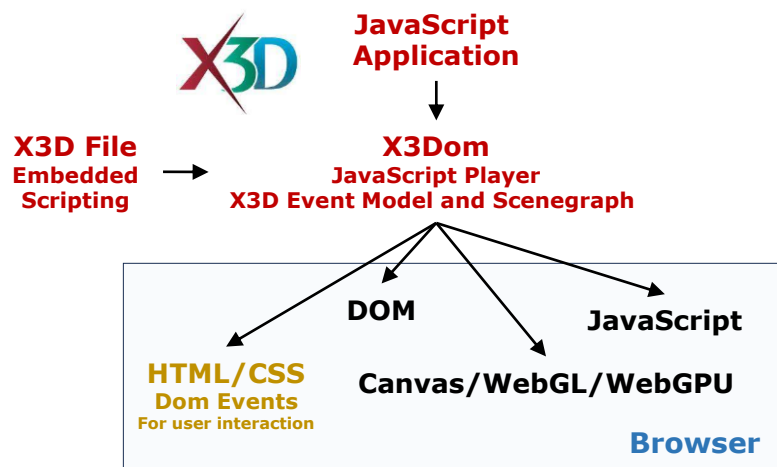


# Which Formats Also Standardize Runtime Behavior?

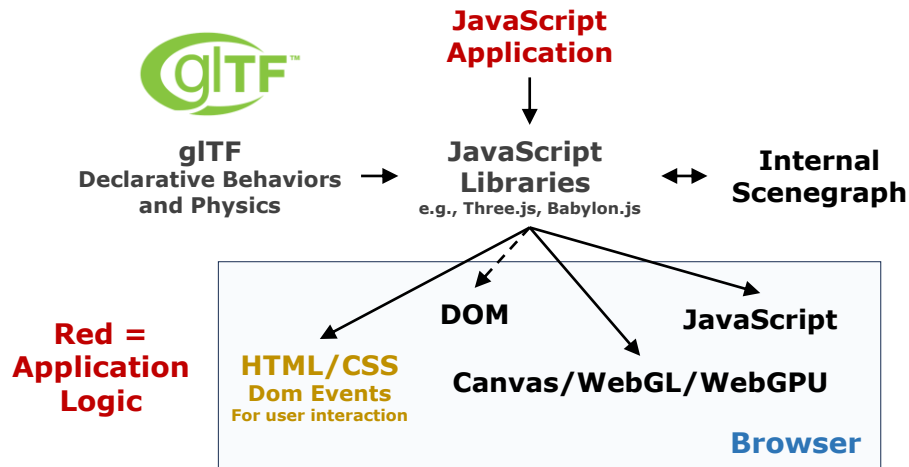




# Bringing 3D to the Web... the Story So Far



The DOM is used to store 3D nodes making up the scene graph



**Red = Application Logic**

The 3D scene graph is managed by the application through library calls

# Metaverse and the Web – Brainstorm Questions!

Do we want to want to integrate the metaverse with the current Browsers  
or create a whole new type of internet/web client?

Will we use, expand or replace existing HTML/DOM standards?

Should we standardize 3D runtime APIs and scene graphs or just declarative asset formats?

Will WebGL/WebGPU have enough functionality to support metaverse applications?

Is JavaScript sufficient for advanced metaverse applications?

What other layers in the Internet Protocol Suite will need upgrading? E.g., is QUIC enough?



**Cooperative exploration and development between  
multiple standards organizations will be essential**



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