Evolving an Interoperable Metaverse

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Topics

1. What do we mean by ‘the metaverse’ and how might it come into existence?
2. Why interoperability standards are vital to building an open and inclusive metaverse
3. The need for broad interoperability cooperation and the Metaverse Standards Forum
What is the Metaverse?

The World Wide Web changed the world ... ... and the Metaverse is an evolution of the Web

The Metaverse combines the connectivity of the Web combined with the immersiveness of Spatial Computing
Combining multiple disruptive technologies

- Artificial Intelligence (AI)
  a.k.a. Machine Learning
  Natural user interfaces
  Scene semantic understanding
  User generated 3D content

- Decentralized Trust and Storage
  ID and Reputation
  Economic transactions
  Persistence

- Realtime photorealistic graphics and simulation
  Scenes, avatars and objects

- XR – Virtual Reality (VR) and Augmented Reality (AR)
  VR for generated environments
  AR to overlay the real world

1992
Humans, as avatars, interacting with each other and software agents, in a three-dimensional space that uses the metaphor of the real world – the ‘metaverse’

Meta Research Labs
Grand Theft Auto 5
Meta Quest Pro
Proto-Metaverse Consumer Use Cases

Enhanced student learning and engagement by transforming how educational content is delivered

Realtime, multi-user gaming and socialization

Virtual spaces where gamers create their own content

Forbes, iLRN, Virbela

Augmenting Reality with persistent geo-locking, linking, occlusion and realistic scene illumination

Realistic environments where users can import their own authored assets

Microsoft Flight Simulator

Roblox, Minecraft, Manticore

Realtime, multi-user gaming and socialization

Fortnight, PUBG, Valheim

Open AR Cloud, Niantic

Microsoft Flight Simulator

Forbes, iLRN, Virbela

Real AR Cloud, Niantic

Microsoft Flight Simulator

Roblox, Minecraft, Manticore

Fortnight, PUBG, Valheim
Enterprise Proto-Metaverse Use Cases

Augmented Reality used in guided tasks and remote assistance are proven to boost productivity

Digital twins - virtual representation of a product, process, or place that measures mirrors and its physical counterpart - for monitoring, optimizing and prediction

Spatially indexing and streaming the digitized world for planning, visualization and simulation

Immersive Training significantly increases understanding and retention

Virtual Sports Leagues and immersive viewing of sports events

3D application interoperability for real-time immersive collaborative simulation and design

OGC, Cesium, NVIDIA

PTC, AREA

Algorand, Sports Tomorrow

Microsoft, Google

NVIDIA Omniverse

GE, Siemens, Bentley, NVIDIA
Metaverse Reality

There is only one Metaverse
The metaverse is a platform - just as there is only one Web
The metaverse will enable diverse ‘worlds’, spaces’ and ‘experiences’ etc.
Just as the Web enables ‘pages’ and ‘apps’ etc.

We will live our lives in the metaverse!

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

You will need to plug into a VR headset to access the metaverse

Although VR will deliver some of the most immersive and AR could eventually replace mobile phones, there will be many ways to use Metaverse applications - including phones, tablets and PCs

The Metaverse will be a wild west of crypto currencies and NFTs

Web3 is a young area of innovation – and is still evolving how to enable systems of decentralized trust for ID, reputation and economic transactions

The Metaverse market will be worth Trillions of dollars $ in the next few years

As with many transformative technologies, its evolution will take longer than we think, but its impact will likely be larger than we first imagined
How will the Metaverse Evolve?

The World Wide Web changed the world
But in ways that were hard to predict when it was first invented

Diverse emerging technologies are being brought together in novel ways

- Synthesized visual reality
- Universally portable 3D assets
- Practical XR optics
- Real-time environment scanning and semantics
- End-user 3D content creation tooling
- Accurate physical simulations
- Realistic avatars
- Online personas and social connections
- Machine learning for semantic understanding and assisted content creation
- User identity, security and privacy
- Effective remote social interactions
- Streaming of vast geospatial data sets
- Real-world geo-anchoring with persistence
- IOT sensor networks
- Universal digital twins
- Servers scaling to millions of simultaneous users
- Interoperable run-times
- Online economies and currencies
- Pervasive low-latency wireless connectivity and much more ...

Technologies working together at pervasive scale need interoperability standards!

- Standards accelerate market opportunities and drive increased volume
- Reduce consumer confusion
- Increase product capabilities and usability
- Enable focus on differentiated innovation
- Reduce costs and speed time to market

Recent metaverse visibility has significantly heightened industry interest in open standards - some of which have been in development for years

Darwinian Evolution

Elevates technologies and services that gain market success
Creating a wavefront of commercial opportunities as the metaverse emerges incrementally
Open Standards Make Technology Pervasive

INTEROPERABILITY standards define precise COMMUNICATION
E.g., software to hardware, client to server, organization to organization

Open Standard = Shared Specification

Open Source = Shared Implementation

Open standards with rigorous conformance testing enable consistency across multiple implementations that can meet the needs of diverse markets, price points, and use cases

Open standards often use open source to spread the implementation effort for sample implementations, tools, samples, conformance tests, validators etc...
The Promise of Metaverse Interoperability

**Interoperability is the key to the metaverse scaling beyond a series of disconnected silos**

**Decentralized trust and storage**
Enable any service to access and confirm ID, reputation, payments, ownership and persistent history

**Interoperable 3D objects and avatars**
Take your personal avatar and objects you have earned, built or purchased seamlessly across multiple services

**Travel between different spaces**
With minimal friction and consistent user interface but with agreed ‘border customs’ to respect IP ownership, business models, age appropriateness, gameplay, rendering style etc.

**Etc. etc.**

If achieved, this level of interoperability would escalate the economy and utility of the metaverse beyond any single space or service
Interoperability Standards Make Technology Ubiquitous

Industry Standards
Standards are the basis for ubiquitous infrastructure

Multiple Standards
Widely adopted platforms require many hardware and software standards

Constellation of Standards
An open and inclusive metaverse at pervasive scale will need the right standards at the right time – from many standards organizations!

IEC 60038 Standard voltages
IEC 60228 Conductors of insulated cables
IEC 60269 Low-voltage power fuses
IEC 60320 C13 Connectors and C14 Inlets
IEC 60884 Household Plugs And Socket-Outlets
IEC 61970 APIs for energy management
The Vision of the Metaverse Standards Forum

A Venue for Cooperation between Standards Organizations and Companies to Foster the Development of Interoperability Standards for an Open and Inclusive Metaverse
Better Metaverse Standards – Sooner!

- Coordination and cooperation between SDOs and the wider industry
- Open to all, no participation fee, no NDA, no IP framework
- NOT another SDO! All standardization ‘heavy-lifting’ continues at existing SDOs
- The Forum exists to accelerate the mission of member SDOs and advocacy organizations
June 2022 - 37 Founding Organizations
Today - Over 2000 Members and Counting!

Wide diversity of organizations, including...

SDOs
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, Otoy, 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,
MediaTek, Oppo, Lenovo, ZTE, LG ...

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

3D Commerce
Alibaba, Alvanon, Avaataar, 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, RIAA...
Organizing for Effective Forum Action

1. Gather interoperability Topics from all members
   Online input from all members on actionable topics that need improvement today!

2. Organize Topics into Domains
   Consensus on member interest AND where the Forum has can add industry value

3. Create Domain Working Groups
   Make recommendations and work products publicly available

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
- Metaverse Pharmacy
- Etc. etc..

Topics naturally falling into Domains

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Initial Forum Working Groups

**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

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

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

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

**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
A Unique Cooperative Opportunity

Wide Forum input and broad visibility increases the likelihood of relevance and success of Forum Domain Working Group projects

Any Forum member can propose, lead, contribute to, participate in, or monitor Domain Working Groups that can directly accelerate their objectives. Group Charters and number of participants are focused for effective action.

A unique opportunity for metaverse standards cooperation, coordination and leadership
Your organization is welcome to get involved!
https://metaverse-standards.org/