

글로벌 ICT 표준 컨퍼런스 2022

Global ICT Standards Conference 2022

2022. 11.9.(수)~11.(금)
서울 양재 엘타워 오르체홀(5F)



글로벌 표준화 세미나

Khronos Group과 Metaverse Standard Forum의 주요 표준화 항목

이환용, 산학협력중점교수, 아주대학교,
Khronos Group, Metaverse Standard Forum

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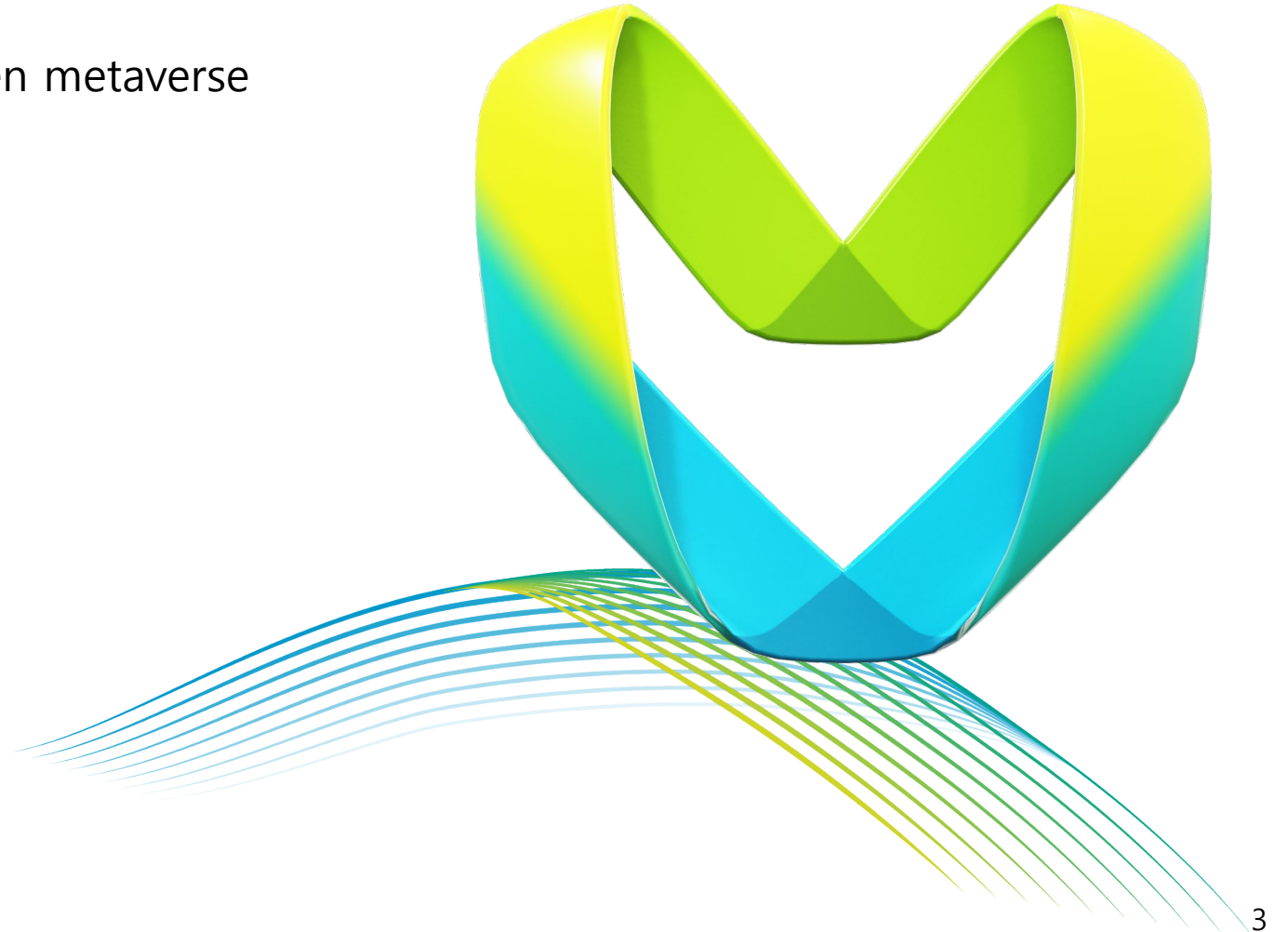
01 Metaverse Standardisation Overview

02 MSF Standard Category

03 Khronos Group Standards for Metaverse

Metaverse Standard Forum

Fostering interoperability standards for an open metaverse



Metaverse - The Interoperability Perspective

What will the metaverse be?

Some mix of the connectivity of the web with the immersiveness of spatial computing...

Diverse 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 ...



Darwinian Evolution

Standards will play a key role in enabling and amplifying the emergence of successful technologies, products and services

Cross vendor, cross-platform interoperability

Software to hardware, server to client, organization to organization ...

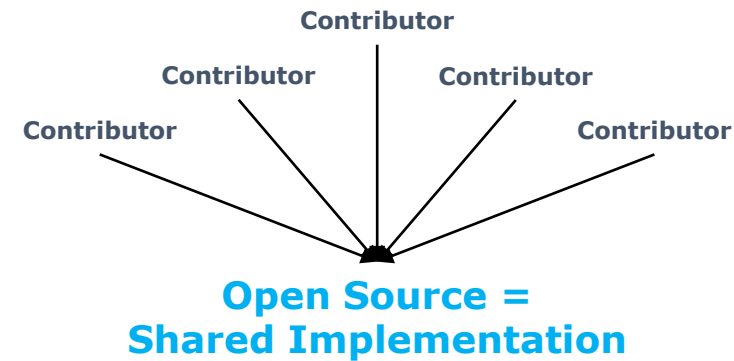
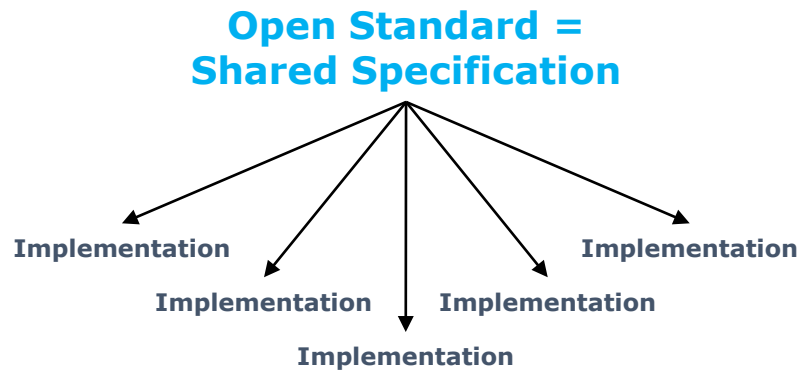
Accelerated business opportunities

Remove needless friction points to reduce costs and speed time to market

Timely standards create the chance to build an open and inclusive metaverse

Key technologies made openly and widely available, enabling and encouraging safe and equitable access for all

Open Standards Make Technology Pervasive



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...

Vision of Metaverse Standard Forum

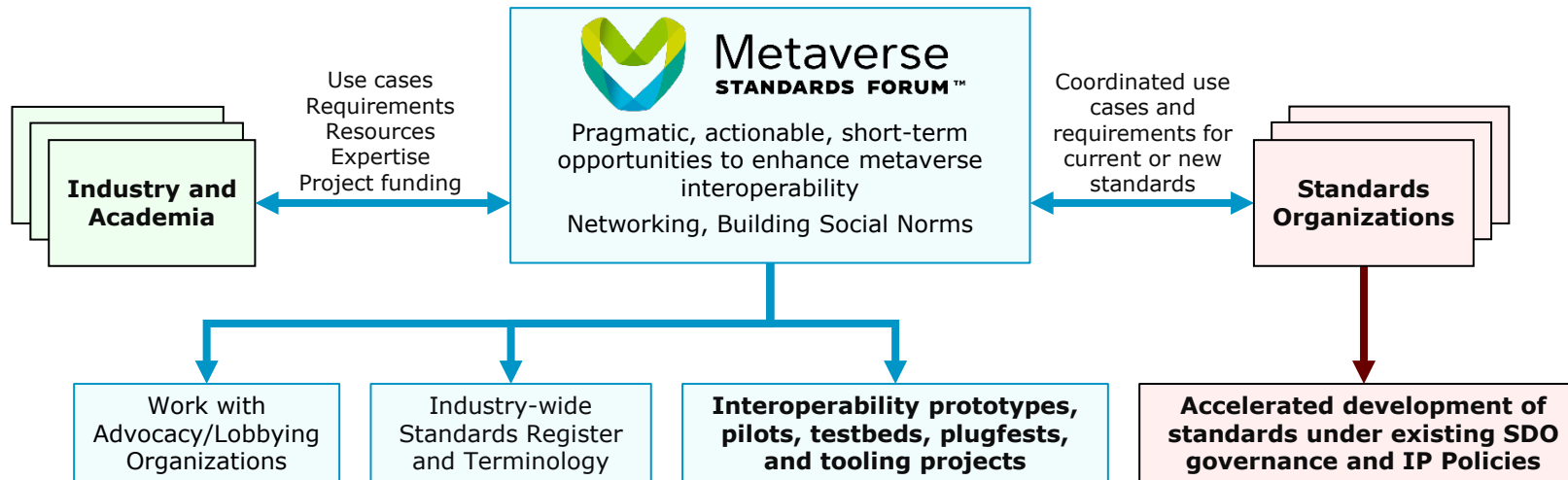
**A Venue for
Cooperation between
Standards Organizations and Companies to
Foster the Development of
Interoperability Standards for an
Open and Inclusive Metaverse**



Metaverse
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Better Metaverse Standards

- 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



Foundation Member - June 2022



Forum Update

- We now have over 1900 member organizations!
 - For new members, the [Forum Plenary Google Sheet](#) is the place to start
 - Introduce yourself, suggest and upvote Topics for the Forum to cover, ask any questions!
- If you wish to be involved in Forum outreach activities – join the [Outreach Group](#) on the Portal
 - [Metaverse Event Listing](#) - Members share details of upcoming industry events
 - [Speaker Bureau Application Form](#) - Apply to join our pool of potential speakers

Blog Released
[First 60 Days of the Forum](#)

[Forum Logo Packs](#)
Available for any member to use



Forum Standards Organization Members

Standards and Advocacy Organizations can leverage Forum for networking, visibility and cooperation to accelerate their own mission



Organizing for Effective Forum Action – One Month In

1. Gather interoperability Topics from all members

Online input from all members on actionable topics that need improvement today!

Over 200 topics suggested and counting..
... some examples so far

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
Metaverse Pharmacy
Etc. etc..

2. Organize Topics into Domains

Consensus on where is member interest AND the Forum has member expertise to add industry value

Topics naturally falling into Domains

Topic	# Upvotes
Metaverse Standards Registry	69
3D Assets	186
Avatars and Apparel	75
Real/Virtual World Integration	98
Geospatial	36
User Identity	72
Privacy, Safety, Security, Inclusion	182
Payments and Economy	39
Governance and Advocacy	24
Teaching, Education, Exams, Certification	65
XR and UI	50
Metaverse Definition	40
Runtimes and Object Model	29
Networking	23
Tooling and Creators	12
Health and Medical	7
Business Analytics	4
Performance and Scalability	9
Gaming	9
Miscellaneous	11
Forum Outreach	1

3. Create Domain Working Groups

Focused discussions for smaller groups, Dedicated Portal group, chairs elected from membership

4. Working Group Projects

Focus on project execution, chairs elected from membership

5. Publish Project Work Products

Examples

Standards Registry

Guidelines and recommendations

Open-source tooling

Plugfest resources and reports

Requirements to pass to Standards Developing Organizations

...

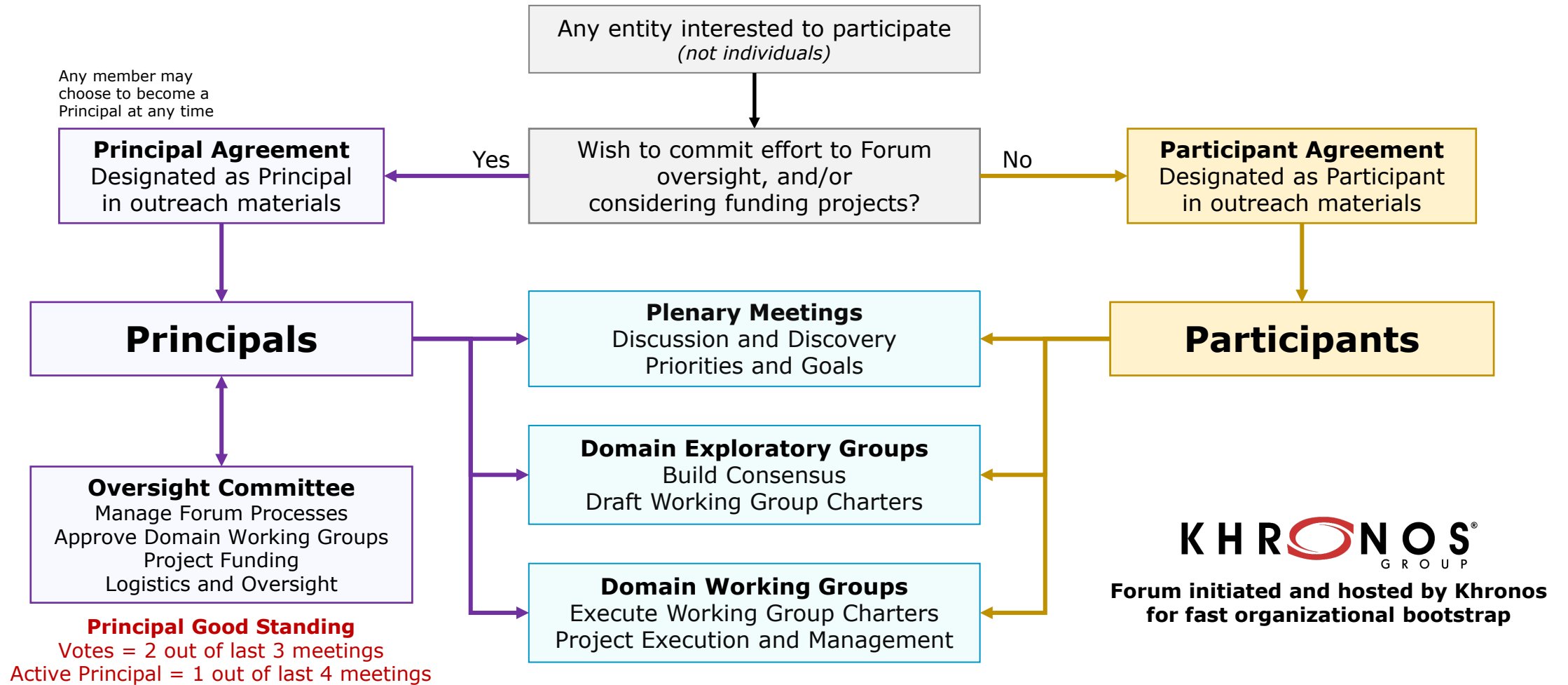
Domain Working Groups and Projects will be formed and start work in 3Q22



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Forum Organization



Example Asset Interoperability Testbed Project

- Goals
 - Confirm asset behaviours and attributes satisfy use cases
 - Test publishing and transmission pipeline
 - Exercise interoperable behaviours in multiple runtimes
- All engine and platform vendors invited to participate
- Cooperative shared open-source and assets



Tools create assets
using open standards

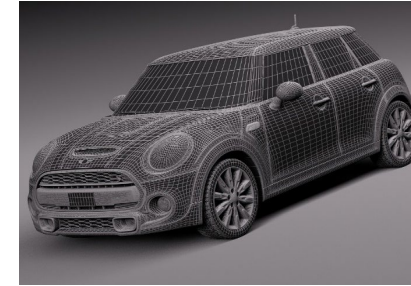
FORTNITE ROBLOX



three.js



Run time engines ingest and
process assets



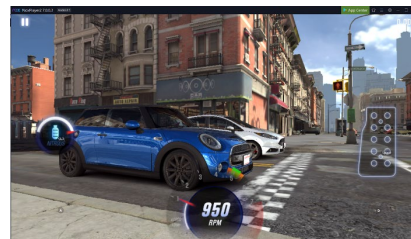
USD-based tools

Author assets and
publish into glTF



Web-based Configurator

Material variants

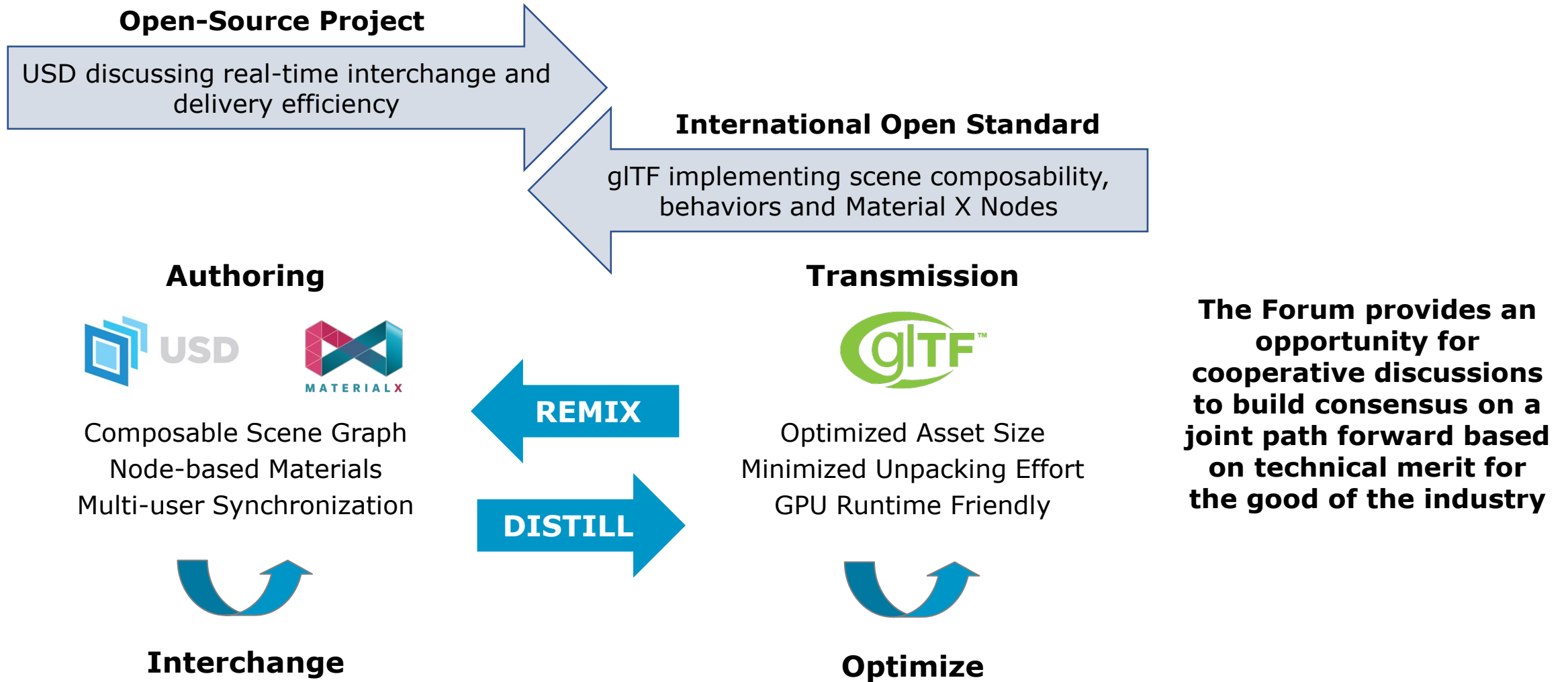


Runtime Demos

Open door, start engine
Drive course with physics
simulation



Example of Possible Coordination and Cooperation



Domain Group Pipeline

Current Domain Group Pipeline
and links maintained at the
[General Dashboard](#)

Consider creating
Exploratory
Group Proposals!

Upvote/Downvote and comment
on Exploratory Group Poll
Provide detailed feedback and
comments in the Google Doc
Contact proposers if wish to be
active contributors

Join Exploratory Groups
Participate in creating and
refining Working Group Charters

Join Working
Groups to help
execute projects

[Interoperable](#)

[Characters/Avatars \(Humanoids
& Non-Humanoids\)](#)

[Privacy, Cybersecurity & Identity](#)

[Digital Asset Management](#)

[Real/Virtual World Integration](#)

[3D Asset Interoperability using USD and glTF](#)
[Digital Fashion Wearables for Avatars](#)

[Standards Register](#)

Any Members can
propose Exploratory
Groups

[Exploratory Group
Proposal Template](#)

Oversight approves sending
Proposal to Plenary for final
member feedback and polling

[Polling Sheet](#)

Approved Exploratory Groups
builds consensus on Charter

[Working Group Charter Template](#)
[Exploratory/Working Group Processes](#)

Approved Working
Groups execute
Charter

Announced on General Email List

Discussions in Group Email Lists



Interoperable Characters/Avatars EG Proposal

**Any comments welcome in the
Exploratory Group Proposal**

**Reach out to Proposers if you
wish to become noted as an
active contributor**



Interoperable Characters/Avatars(Humanoids & Non-Humanoids) Domain Exploratory Group Proposal

1. Proposers

Mike Roberts, Constructive Labs, mike@constructivelabs.com
Shinnosuke Iwaki, VRM-Consortium, miro@vrm-consortium.org
Zeno Saviour, Character Labs, zsaviour@character.xyz

2. Exploratory Group Scope

Build consensus and draft a proposed charter for Interoperable Characters/Avatars(Humanoids & Non-Humanoids) Standards Domain Working Group. The proposed charter would set out goals and key activities to generate insights into character/avatar interoperability standards that will include Humanoids and Non-Humanoids.

3. Proposed Working Group Goals (and Non-Goals) and Deliverables

The goal for this proposal is to identify a common standard for Interoperable Characters/Avatars that can be applied across multiple worlds built using different engines. The scope of this working group will only include characters/avatars made with glb and vrm formats. Special attention would be paid to opportunities for cooperation between multiple initiatives to increase synergy and reduce duplication of effort, gaps, fragmentation and confusion, for the good of the industry.

Research and experimentation will be done in the following order:

A standardized character/avatar that can be dynamically loaded in one virtual world and seamlessly enter into another world while being able to maintain the same looks, with desired behaviors and animations for that world. We will be able to standardize the character/avatar requirements and identify the missing technology pieces here.

Targets for Standardization to enable true Character/Avatar Interoperability:

Standard terminology and nomenclature - Unification of different terms for the same character concepts.

Orientation - Facing of the character mesh and bones relative to the normal frame

Default Posing - Standard posing for humanoids and non humanoids. Comparison will be made with previous industry standard poses such as T Pose, and A Pose for humanoids.

Bone Names & Topology: Standards for creating bone names and the skeletons implied by them.

Animations: Standard ways to link animations.

Socket Names: Standard sockets that are available in all characters that can be used for wearable attachment or a gameplay trigger.

Facial Expressions: Required bones on the face to facilitate character expressions, such as expressed by visemes, lip flapping, other facial animations.

Material/Texture Names - Material/Texture embedding name standards.

Eye Height - Standard method for determining eye height, important for VR first-person applications

Height of the Character: Standardize the height of the metaverse character to create relative height proportions for all the characters.

Metadata - Insertion points for data segments into the character file, covering extensions and vendor supported data within the common format.

Attachment points and attachments - Points for the attachment of weapons, clothing (MR: is this sockets?)

Collision and bounding data - Simple bounding information that makes the character usable in a situation where it is affecting world data by physical interactions, such as pushing or touching, without real-time processing of the underlying character mesh.

Physics Data - Chains for attachments, such as ponytails, clothing

Asset Specifications:

Mesh Polycounts - Standard polycount with level of detail as needed by the world.

Texture Resolutions - Standard texture resolution with level of detail as needed by the world.

Texture Formats - jpg, png, webp

Asset types - usd, glb, gltf, vrm



Projects:

- Interoperability of a character/avatar across different worlds built using different engines(at least 3 worlds with consideration for Unity, Unreal, Three.js, ConstructiveLabs)
- Import library - import library, based on existing asset loader code, that loads characters described by the specification (probably C++)
- Prototype to understand glb and vrm compatibility across different virtual worlds.
- Runtime animation retargeting (out of scope)

Engagement:

- o Collaborate with MSF 3D Asset Interoperability Working group for alignment on general 3D asset interoperability standards.
- o Collaborate with MSF 3D Fashion Wearables Working group for fashion wearable compatibility.

According to the proposers, the following needs to be considered in a separate proposals

- Character/Avatar Creation
- Character/Avatar Wearables

4. Coordination

<Companies, SDOs, and other organizations whose participation or input would be essential to the success of the Working Group - including organizations that are not currently Forum members>

Unreal Engine (Epic Games)

Unity

PlayCanvas

ThreeJS

BabylonJS

GoDot

Microsoft

Meta

Gaming Companies (EA, Rockstar, Ubisoft, 2k etc.)

5. Risk Factors

- Lack of funding for prototyping and testing
- Lack of contributions to/adoption by larger industry players

6. Target timeline to create proposed Working Group charter

10 Weeks

7. Additional Contributors (Participants contact Main Contact to be added)

<Forum members who wish to proactively contribute to this activity>

Contact, Organization, Email, Specific area of contribution

8. References

< A Forum Topic Brainstorm Sheet section, other materials >


< Link to Draft Google Doc (a useful starting point for updates when approved and printed to PDF) >



Privacy, Cybersecurity & Identity EG Proposal

- Narrowed focus onto key initial topics of Privacy, Cybersecurity & Identity
- Increased clarity that the Forum would complement, not duplicate/compete, with existing advocacy and lobbying organizations
- Undertaking direct advocacy or lobbying is a NON-GOAL, that is to be left to existing organizations - just as the Forum is not an SDO, but a venue for SDO coordination
- NOT focused on technical APIs to implement Identity/Security, but the information and context gathered may initiate additional Exploratory Groups to address technical aspects in this Domain
- This Group is focused on aggregating information to be considered BEFORE setting policy and standards

**Please vote in
Exploratory Group Poll
and comments welcome in
Proposal Google Doc**

**Metaverse
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**Privacy, Cybersecurity & Identity
Domain Exploratory Group Proposal**
DRAFT

1. Proposers
*Louis Rosenberg, Responsible Metaverse Alliance (RMA)
Kavya Pearlman, XR Safety Initiative (XRSI)
Nikki Pope, Nvidia*

2. Exploratory Group Goals
Build consensus and draft a proposed charter for a Privacy Cybersecurity & Identity Domain Working Group

3. Potential Working Group Goals and Deliverables
The proposed charter would set out goals and key activities to generate insights and make recommendations into leading Privacy, Cybersecurity & Identity efforts and curate standards, guidelines, policies and technical frameworks for various metaverse related use cases and across various jurisdictions. Special attention would be paid to opportunities for guiding non-governmental declarations, corporate policies, industry norms, and guidance to enable responsible innovation, mitigate human and societal harm that stem from objective and subjective privacy risks, cybersecurity and identity risk management at the global level.

Early examples of possible activities to be captured in the charter include:

Stakeholder Engagement

- Engage with key stakeholders with the following objectives:
 - Catalog existing key initiatives, projects and frameworks for privacy protection, identity protection, and cybersecurity protection within and between Metaverse environments, including design level, protocol level, and policy level undertakings.
 - To learn from Metaverse platform, application & service providers key technical and regulatory challenges and opportunities around privacy, cybersecurity & Identity.
 - To learn from metaverse researchers, users, and watchdog groups about any anticipated or realized harms resulting from insufficient privacy, cybersecurity, or identity controls.
 - To exchange knowledge with regulatory entities, creators and Metaverse citizens on emerging mechanisms of privacy risk management and identity protection.
 - To ensure privacy, cybersecurity, and identity protections are baked in and constantly thought of in every part of the process and protocols.
 - To establish key performance metrics, in terms of what to measure going forward, to understand whether the proposed recommendations are working towards the desired outcome (i.e., achieve an understanding of need, desire, and value).

Establish scope of Knowledge Curation, Research & Development


- Establish baseline scope of the knowledgebase, research and development related to Privacy, Cybersecurity and Identity. A few examples could be:
 - Safeguarding children privacy & identity in the metaverse
 - Safeguarding consumers privacy & identity in the metaverse
 - Safeguarding patients (medical) privacy and identity in the metaverse.
 - Safeguarding workers (employee) privacy and identity in the metaverse.

Documenting risk factors and opportunities related to Privacy, Cybersecurity and Identity

- Identify, outline and document the reasoning as well as associated risk factors that motivate the formation of the working group.
- Through investigative work, the team can come to understand how and why risks and problem(s) occur, what effect the risks have on organizations and society, both regional and global. The working group can thus understand the magnitude of the problem and opportunities for organizations, governments, not-for-profit, and education; entities, products, and services.

Metaverse Standards Forum Domain Exploratory Group Proposal Template V1 Aug22 DRAFT

1 of 2

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- To identify the risk factors, via multidisciplinary alignment to discover the unintentional consequences.
- To disseminate findings about risk factors and actual harms, both anticipated and realized.

Generate key recommendations pertaining to Metaverse Privacy, Cybersecurity and Identity

- Put forward recommendations to adopt principles such as "Human-Centric Privacy by Design", business practices guidance and more.
- Recommend priorities and governance mechanisms around engineering, design, operations, responsible innovation, compliance and regulatory aspects.
- Recommendations around the threshold of enforcement action by the national authorities, and the obligation principle maintaining basic rules of conduct.
- Document best practices and capacity-building concepts that will enable organizations to adopt robust, human-rights based, trustworthy, privacy-friendly, sustainable, transparent and inclusive approaches, towards the use and/or deployment of Metaverse components and building blocks.
- Identify priority areas of action on Metaverse development in alignment with Privacy, Cybersecurity & Identity domains.

<Set out at a high-level what the potential goals of a Working Group would be - to give enough flavor so the Oversight Committee can evaluate the proposal, without writing the detailed charter itself. Can use examples of potential investigations, projects and industry engagement to give additional color and context>

4. Non-Goals:

- The Group within the Forum itself will not undertake any direct advocacy or lobbying activity and such activities are to be left to civic organizations - just as the Forum is not an SDO, but a venue for SDO coordination
- The Group is NOT focused on technical APIs to implement Identity/Security; however, the information and context gathered may initiate additional Exploratory Groups to address technical aspects in this Domain

5. Coordination
<Companies, SDOs, and other organizations whose participation or input would be essential to the success of the Working Group>

6. Risk Factors
<Particular risk factors that may prevent the Working Group from being effective, to encourage proactive amelioration>
Working group size: The more people in the group, the more schedules to accommodate, parts to delegate, opinions to consider, pieces to integrate, etc.
Heterogeneity: Diversity of perspectives is one of the principal advantages of groups and without diversity, the Working Group conclusions and recommendations might be skewed.
Competing Priorities: The scope of the work covers several critical aspects and that may lead to competing priorities, in terms of the order and necessity to address them.

7. Target timeline to create proposed Working Group charter
10 Weeks

8. Additional Contributors (Participants contact Main Contact to be added)
<Forum members who wish to proactively contribute to this activity>
Liz Shubov - XRSI Adviser
Sarah Klain - Responsible Metaverse Alliance
Kristina Podnar - Metaverse Reality Check (The MRC)
Kohei Kurihara - XRSI Adviser | CEO - Privacy by Design lab
Eric Klein - Cloudfonix, Inc. | COO and CISO
Kat Moynahan - Microsoft

9. References
[XRSI Recommendations for the Biden-Harris Administration](#) for building responsible, safe, and inclusive extended reality Ecosystems (the Metaverse)

<A [Forum Topic Brainstorm Sheet](#) section, other materials >

Metaverse Standards Forum Domain Exploratory Group Proposal Template V1 Aug22 DRAFT

2 of 2

Digital Asset Management Exploratory Group

- Topics being explored
 - Decentralization vs. Centralization
 - Identity and Credentials
 - Asset Ownership
 - Competition and Transparency
 - Asset Properties & Metadata
 - Persistence, Teleporting, Free Movement
 - Technical Requirements
 - Privacy, Security and Access
 - Diversity, Equity and Inclusion
- 131 Members so far
 - Representing over 100 companies
- First Meeting tomorrow
 - 7AM PT, Thursday 27th



Matt White
CEO, Berkeley Synthetic



Marcus Koh
GPNFTS



Alan Smithson
Co-Founder, MetaVRse

Real/Virtual World Integration Exploratory Group

- Co-chairs
 - Steve Smyth steve@opensiteplan.org
 - James Jackson james.jackson@openarcloud.org
- 157 Members
 - Tech companies, content creation tool vendors, content creators, government agencies
- Meetings
 - Every two weeks via Zoom at 12:00 CST (UTC-5 until 6th Nov then UTC-6)
- Goals
 - Define scope, starting with survey: 35 topics were proposed - now discussing and prioritizing according to relevance, urgency, and feasibility given the membership and resources of the exploratory group
 - Build consensus and draft a proposed charter(s) for a small number (1-5?) working group(s)
 - Specify concrete projects intended to result in running code/systems and demonstrations
 - Finish these three steps by January 2023
 - Kick off working group projects once Charter Approved
- Summary of first two meetings
 - Defining scope – rounds of discussion centered on a spreadsheet of interests from survey
 - Apparent consensus: Focus on things that can be demonstrated via prototypes
 - Still discussing member positions and tentative prioritization of topics from survey with potential for becoming focus of working group(s)



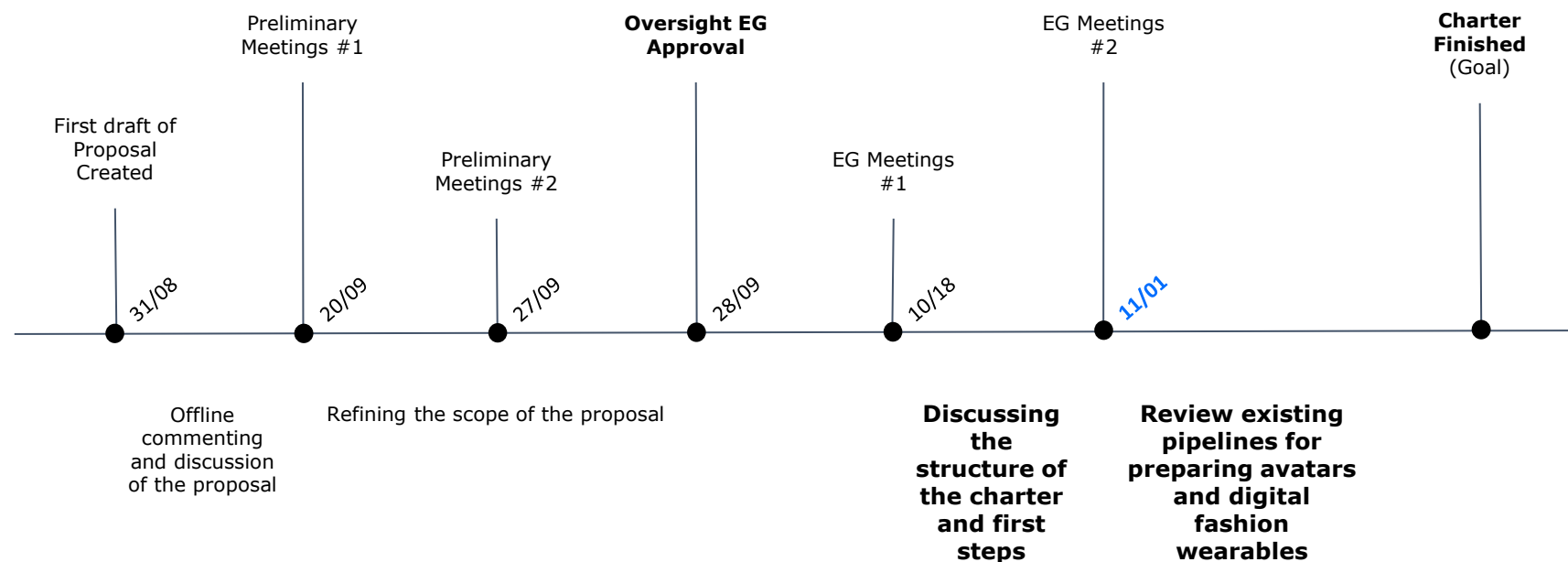
3D Asset Interoperability using USD and glTF EG

- **185 Members**
- **Exploratory Group Call #1 tomorrow!**
 - 10AM Pacific Time, 27 October 2022
 - [Zoom info](#) is on the portal
- **Potential Working Group Goals**
 - Generate insights into leading 3D interoperability initiatives and to foster their evolution to meet prioritized industry use cases
 - Special attention would be paid to opportunities for cooperation between USD and glTF to increase synergy and reduce duplication of effort, gaps, fragmentation and confusion
- **Tomorrow's Call Agenda**
 - Brief review of the exploratory group proposal
 - Proposer introductions
 - Cadence for exploratory group work; rough timeline to write a charter and propose domain working group
 - Future meeting schedule (poll)
- Contributions always welcomed, encouraged, and necessary for our collective success
 - Patrick Cozzi, patrick@cesium.com



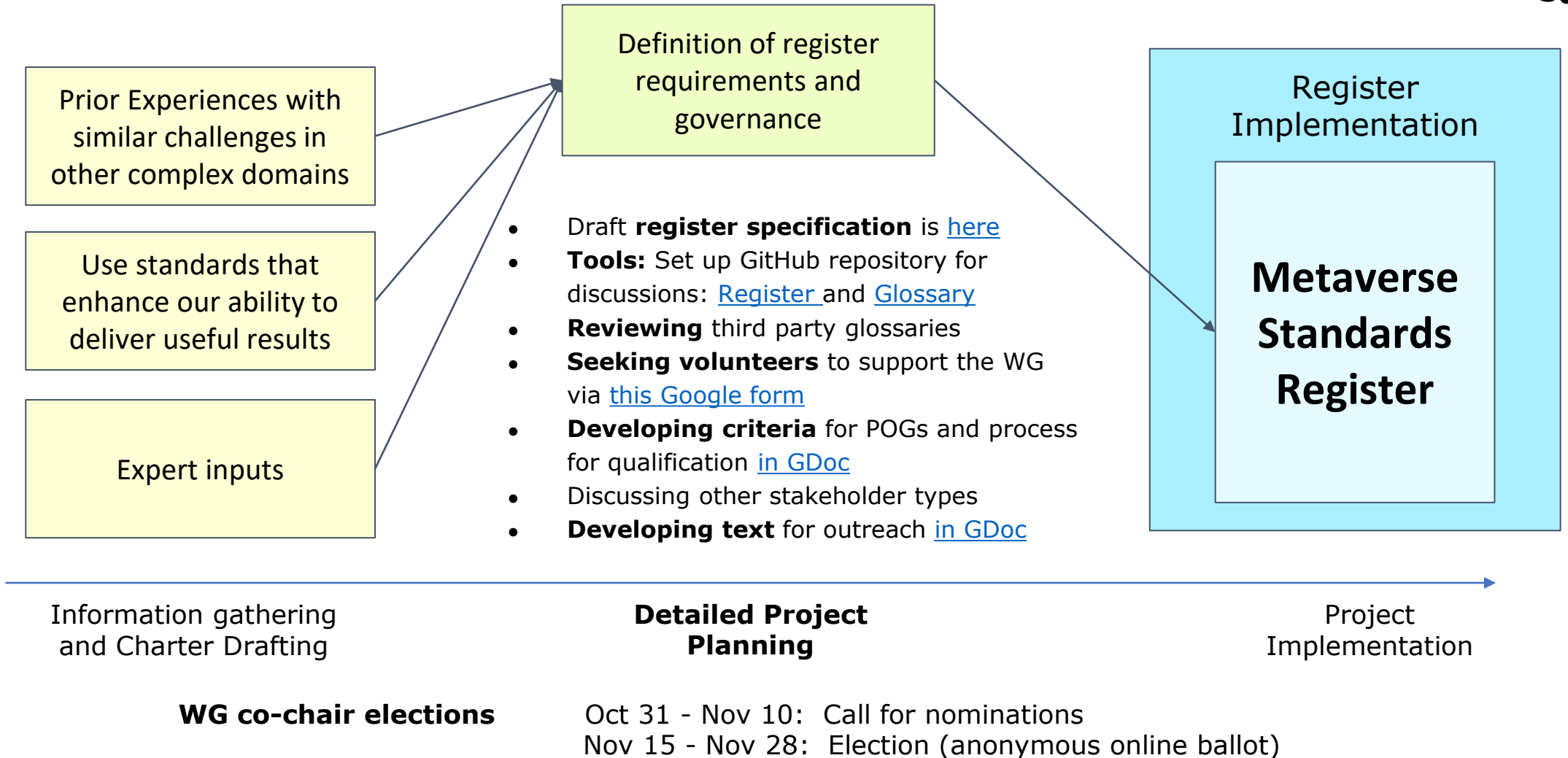
Digital Fashion Wearables Exploratory Group

- Co-chairs
 - Jack Botvinovski, Gravity Layer, jbotvinovski@gmail.com
 - jin OMI, Open Metaverse Interop group
 - Aditya Mani, YOLOgram Style
- Topics
 - Clothing (including a layering system)
 - Shoes
 - Hats
 - Accessories



Standards Register WG Status

**3rd meeting is next Monday (Oct 31),
but we normally meet on Tuesdays**





Metaverse

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**Standards Cooperation for an Open
and Inclusive Metaverse**

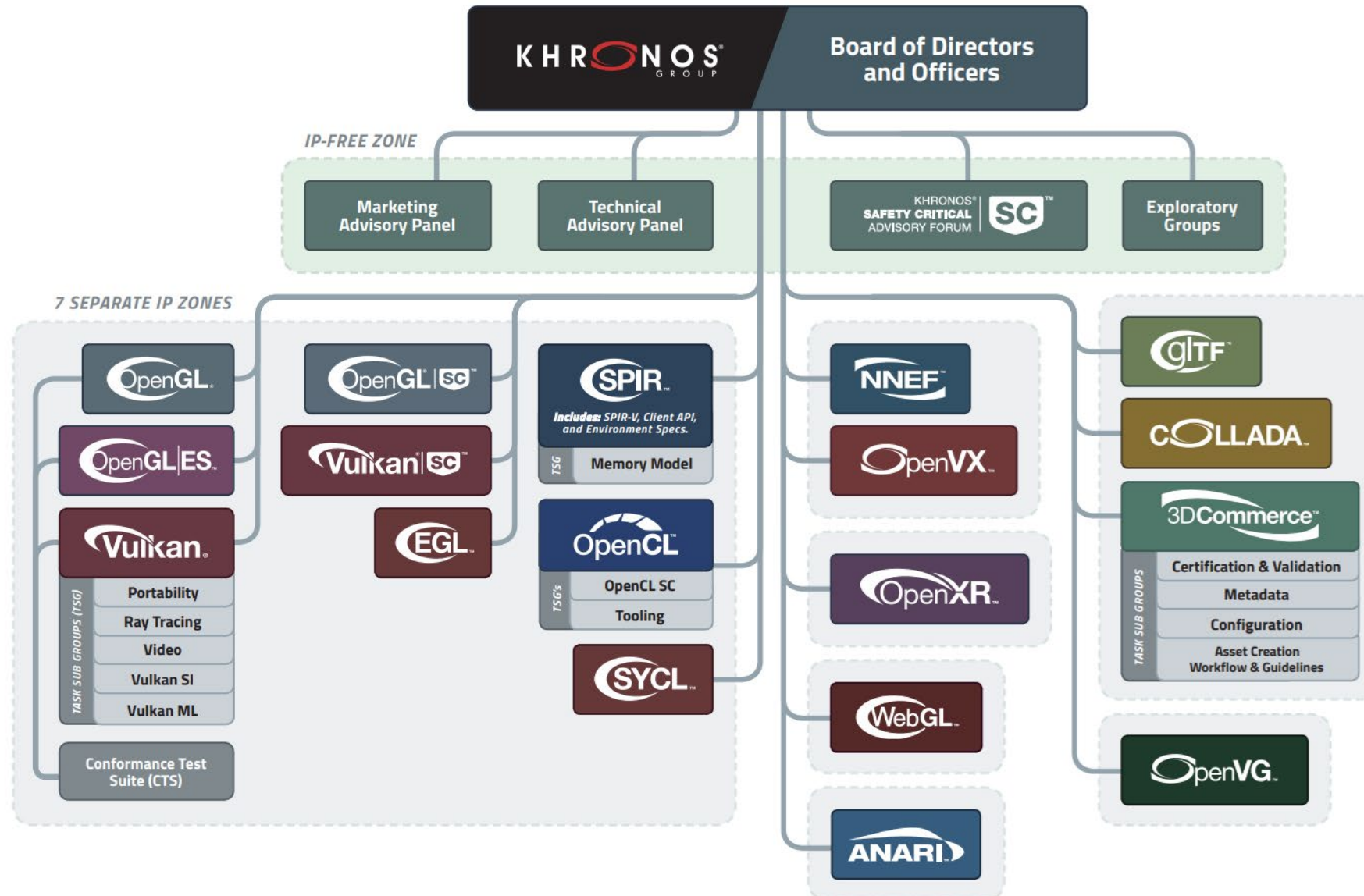
metaverse-standards.org | [@Metaverse_Forum](https://twitter.com/Metaverse_Forum)



Khronos Standards for Augmented Reality and the Metaverse

Hwanyong Lee

Khronos Organizational Chart



Khronos Active Standards

3D Graphics Desktop, Mobile and Web



3D Assets Authoring and Delivery



Portable XR Augmented and Virtual Reality



Parallel Computation Vision, Inferencing, Machine Learning



Safety Critical APIs



Khronos Standards and Augmented Reality

Khronos has been working on standards relevant to augmented reality for many years



*New Camera Working Group
announced February 2022
To streamline sensor integration
into AR systems*

Render high performance,
low-latency graphics



Cross Vendor 3D Graphics
GPU graphics and compute acceleration
for native and web platforms

Drive XR displays
and devices



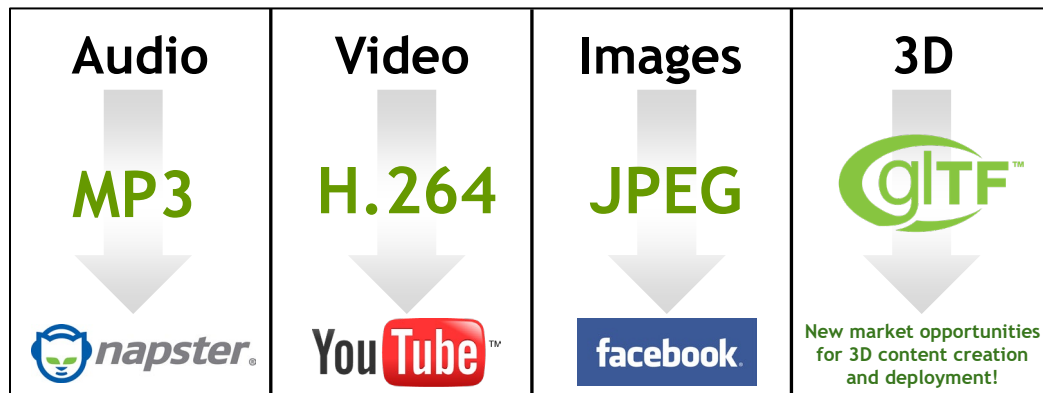
Portable XR
Cross-vendor API for XR runtimes,
HMDs and UI

Pervasive distribution
of compelling 3D content



Run-time 3D Assets
Efficient deployment and
display of models and scenes

glTF - The JPEG of 3D!



Efficient, reliable transmission
Bring 3D assets into 100s
of apps and engines



glTF 1.0 - December 2015
Primarily for WebGL
Uses GLSL for materials



glTF 2.0 - June 2017
Native AND Web APIs
Physically Based Rendering
Metallic-Roughness and Specular-Glossiness

Thank you



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