

Interoperable Character/Avatar Working Group Charter

FINAL

Approved by Oversight Committee August 22, 2023

1. Status and Change History

22nd August 2023 - First Version

2. Officers

The Working Group will follow current Forum Domain Group processes, with initial elected officer positions of three to four Working Group co-chairs.

Appointed chairs until the first election:

- Hideaki Eguchi, VRM Consortium
- Zeno Saviour, Character Labs

3. Motivation

The surge in the popularity and implementation of avatars and characters in gaming, virtual worlds, and the metaverse is on an upward trajectory. A myriad of creator tools, often designed to be used with specific applications, are now available in the market. Multiple platforms and applications are leveraging a diverse range of techniques, providing use-case-focused avatars and characters across multiple market segments.

This market demand has triggered a proliferation of standards, open source projects, engines, platforms, and tools that need to accommodate a growing range of avatar and character use cases. At the same time, new business opportunities and technical efficiencies could be achieved through collaboration over avatar/character formats to enable the following potential benefits:

- Authoring tools that could create/generate avatars for multiple platforms, creating a larger market for, and encouraging investment in, avatar tooling.
- Runtime engines and platforms that could ingest avatars created by a diversity of tools for richer content and faster innovation.
- Platforms that could choose to participate in non-siloed economies for networked economic and technical advantages.
- Users that could use an avatar across multiple platforms, increasing the incentive to invest time (and potentially payments) in sophisticated avatars that don't have to be recreated for every application, while projecting a consistent persona.

4. Goals and Non-Goals

The Working Group will foster collaboration and discourse among stakeholders in avatar and character technologies including companies, open-source projects, and standards developing organizations (SDOs). The goal is to identify and resolve interoperability issues and create opportunities in key use cases where a quorum of industry players wish to cooperate, encouraging incremental expansion of interoperable avatar and character capabilities that grow technical and commercial opportunities for all involved.

Avatars and characters are used in a wide diversity of applications and engines with specific technical constraints, requirements and aesthetics. Therefore avatar interoperability will need more subtlety than trying to force the use of 'identical avatars everywhere'. Instead, it may involve the selection or transformation of common avatar attributes that are appropriate and possible to support on a particular platform.

Common avatar attributes may involve aspects of meshes, materials, skeletons, animations, physical simulation parameters, and metadata for avatars and characters to be processed across platforms in a way that balances the creator's original intent, with platform constraints and aesthetics. Accordingly, it is NOT a goal to impose common run-time behaviors on multiple platforms, but rather enable the exchange of avatar assets that may be used or converted at the discretion of an engine, to drive voluntary, common cross-platform appearances and behaviors.

The Working Group is not a SDO, therefore we will not directly design standard specifications; but we will work with SDOs and companies to provide guidelines, requirements, use cases, certification tooling, test data/results

and other information to foster and assist any relevant SDO's efforts related to 3D character/avatar interoperability.

The Working Group will consider humanoid and non-humanoid characters due to common requirements such as format translations, universal anchor points, base-level metadata, general optimizations and guidelines, but will create subgroups as necessary to enable focused specialized work such as facial animations and skeleton rigs.

This Working Group will focus on real-time rendering use cases and will not include other cases, such as medical use cases that require additional capabilities such as the definition of internal organs.

The Working Group will continue to invite guest speakers from key players to foster insights, discussion, and engagement related to ongoing work. These guest lecture sessions will be made available on the Forum Portal and Youtube speaker library.

The Working Group may experiment in holding meetings and other events virtually to exercise potential use cases and Working Group deliverables.

New projects that fall within the scope of this Charter may be initiated without additional Oversight approval.

5. Deliverables

5.1 Use Case Matrix

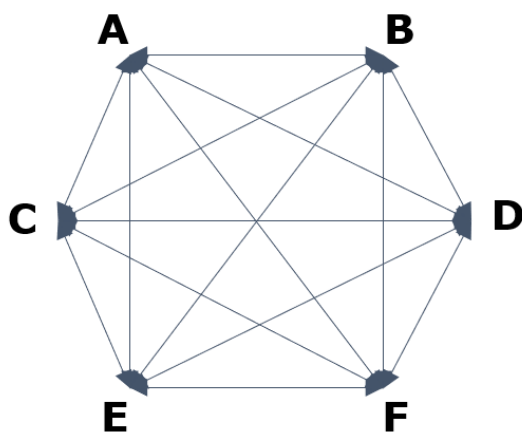
The Working Group shall create a matrix of priority use cases versus key interoperability requirements. This matrix shall be used to exercise and refine the other Working Group deliverables below.

5.2 Avatar and Character Translation Framework

The potential benefits of enabling multiple tools and runtimes to exchange avatar and character data are outlined in section 3 above, however it is not feasible, or necessarily desirable, for multiple applications to use the same internal avatar format as runtime engines typically use proprietary internal formats due to development history, platform constraints, business and use case imperatives and aesthetics. However, this makes exchange of avatar and character data problematic, as any tool or application would need to import or export multiple proprietary formats.

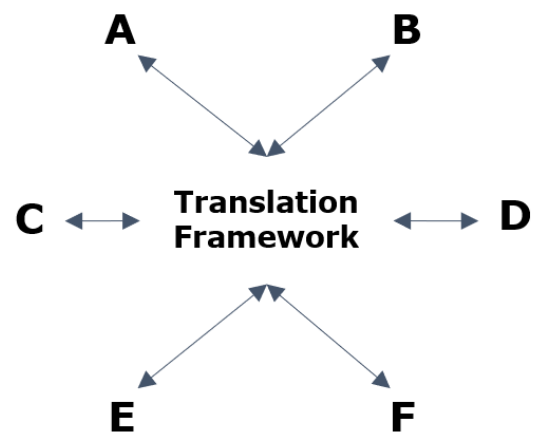
It is therefore proposed to incrementally define an Avatar and Character Translation Framework that comprises a common baseline asset format using glTF 2.0, together with a set of recommended guidelines for handling import and export of meshes, materials, skeletons, animations, physics, and metadata.

Multiple Avatar/Character Tools and Platforms



Before

Each tool or platform must import or export every other proprietary avatar format



After

Each tool or platform can import/export using a single agreed asset format and guidelines

Tools and platforms may choose what internal avatar data to translate and export using the Translation Framework for other tools and applications to straightforwardly import. An exporter does not need to populate all

data fields defined by the Framework, just data that may be meaningfully converted, and which the application chooses to export.

Similarly, engines may import just the Framework data fields that are relevant to their needs, populating other internal data structures as they wish, or converting any data fields to meet any platform technical or aesthetic requirements.

Developing the Translation Framework is intended to be an effective vehicle to build consensus on common data representations and guidelines for avatar and character data interoperability that tools and engines may leverage if and when it provides them benefit, fueling incremental expansion of the scope of the Translation Framework over time.

5.3 SDO Specification Requirements

Where the development of the Translation Framework highlights deficiencies or desirable enhancements in glTF or other interoperability standards, requirements documents will be generated and sent to the owning SDOs for consideration.

5.4 Avatar Test Assets

The Working Group will produce a set of test avatar assets to confirm the design of the Translation Framework data format, guidelines and exercise the correct operation of importers.

5.5 Avatar Asset Certification Tool

The Working Group may create an open source certification application that can be used to check if avatar assets conform to the Translation Framework format and guidelines.

6. Technical Topics

The following topics will be considered in the development of the Translation Framework. The Working Group will research and evaluate existing techniques and build consensus on what common data formats and guidelines may be beneficial for avatar interoperability.

6.1 Facial Animations

Creation of facial bones and their use in animation. The variety of potential blend shapes and the methods of blending across the blend graph. Usage of newer techniques like machine learning-driven facial animations and more.

6.2 Anchor Points

Common anchor points for wearables such as clothing, skins, and jewelry, as well as hand-held items such as weapons. This will include the apparel true-to-fit use case, working closely with the Fashion Wearable Domain Group, and other interested SDOs and organizations.

6.3 Physics

Physical simulation properties such as stiffness and damping that drive the behavior of hair, cloth and other movable components based on the principles of physics in response to user interactions, wind, gravity, and other stimuli. Includes techniques such as weight painting and the addition of rigid bodies in determining each vertex or bone's influence within a cloth or a hair mesh simulation.

6.4 Meshes

Common avatar/character mesh structures, including optimizations for effective animation.

6.5 Materials

Materials and textures, including a range of aesthetics from toon rendering to photorealistic Physically Based Rendering (PBR).

6.6 Skeletons and Skeletal Animations

Definition of skeletal structures and animations including both Inverse Kinematics (IK) and Forward Kinematics (FK) in humanoid and non-humanoid avatars/characters for movement and interactions. Consistent, precise animations for accurate avatar/character playback as authored.

6.7 Optimizations

Investigate asset loading optimization strategies, including level of detail (LOD), low polygon modeling, and DRACO compression for efficiently loading avatars or characters across various runtime clients, including mobile devices, PCs, head-mounted displays, consoles, and more.

6.8 Base-level metadata requirements

Metadata design and requirements necessary for consistent import and usage of avatar and character assets to facilitate loading of characters into multiple runtimes.

7. Milestone Plan

The Working Group will release incremental deliverables to demonstrate sustained progress and build increased interest and participation while building consensus.

Deliverable milestones will include, after the formation of the Working Group:

- One month: Continuing updates to the Avatars and Characters speaker YouTube video library
- Three months: an initial Domain report on the formation of the Working Group including the Use Case Matrix, and a detailed plan for the creation of the Translation Framework and associated assets and tools.
- Twelve months: first release of the Translation Framework with any necessary SDO Specification Requirements, Test Avatar Assets and open source Certification Tools, followed by ongoing updates.

8. Coordination

The Working Group will engage cooperatively with groups within and external to the Forum, including:

- Metaverse Standards Forum: 3D Asset Interoperability Working Group
- Metaverse Standards Forum: Digital Fashion Wearables for Avatars
- Metaverse Standards Forum: Digital Asset Management
- Metaverse Standards Forum: Privacy, Cybersecurity & Identity Exploratory Group
- Alliance for OpenUSD
- Open Metaverse Interoperability Group (W3C Community Group)
- The VRM Consortium
- Khronos 3D Formats Working Group (for glTF)
- Khronos Avatars Anchor Points for 3D Commerce
- Web3D Consortium (for X3D and HAnim)
- IEEE P3141 (for 3D Body Processing)
- Moving Picture Experts Group (MPEG)

The Working Group will also engage cooperatively with character/avatar creators, 3D game engines, and production studios such as:

- Unreal Engine (Epic Games)
- Unity
- PlayCanvas
- ThreeJS
- BabylonJS
- GoDot
- Pixar (USD)
- Microsoft (including Minecraft)
- Roblox
- Meta
- ZEPETO
- Union Avatars
- ReadyPlayerMe/Wolf3D
- Alvanon
- SnapChat
- Character XYZ/ Character Labs
- Marvelous Designer
- Gaming Companies (EA, Rockstar, Ubisoft, 2k etc.)
- Virtual World Platforms (VRChat, The Sandbox, Decentraland, Somnium Space, Second Life etc.)

- 3D Creation Tool Providers (Autodesk, Blender, Adobe etc.)
- Multiplayer Solution Providers (Photon, NormalVR etc.)

And other organizations and initiatives identified during the Working Group's ongoing work.

9. Communication Plan

Ensuring effective outbound communication is essential to fulfilling our mission. To establish and enhance industry credibility, we will prioritize tangible deliverables and actively communicate their availability and benefits to Forum membership and the wider industry, often utilizing key industry events such as GDC, AWE, SIGGRAPH, and SIGGRAPH Asia. To improve visibility and encourage participation, major deliverables will be promoted through Forum press releases.

Internally, we will maintain a consistent practice of sharing effective meeting minutes and promptly notifying updates through both email and Discord channels.

10. Risk Factors

The success of this Working Group depends on the support and involvement of many individuals, SDOs and corporations. However, their interest and commitment may change over time. To reduce this risk, we will focus on activities, projects, and outcomes with a strong consensus for immediate benefits to participants.

Active Working Group participation takes a commitment of time and effort. To streamline Working Group operations, the Forum and Working Group officers will provide helpful resources to ease participation, and ensure that members drive real-world benefits that justify their ongoing participation.

The success of this Working Group will be determined by the adoption of its deliverables by many SDOs and companies. To reduce this risk, we will focus on involving key players who are also part of the creation of this deliverable.

11. Working Group Renewal

The long-term goals of this Working Group will require a sustained multi-year effort. To keep the Charter in sync with evolving member, community, and industry needs and to encourage ongoing engagement in oversight and the direction, the following is proposed:

- 1) The Working Group Charter is renewed at least every 24 months (two years)
- 2) Semi-annual reports to Oversight on Working Group progress towards goals and member participation
- 3) Annual reports to the Forum to be used as part of an overall Forum public annual report.

12. Project Funding and Resources

Funding requests to the Oversight Committee will be raised on an as-needed basis and may include documentation, asset and tools development, and promotional activities.

13. References

[Interoperable Characters/Avatars \(Humanoids & Non-Humanoids\) Domain EG Proposal](#)
[Interoperable Characters/Avatars - Guest Speaker Series - Part I](#)
[Interoperable Characters/Avatars - Guest Speaker Series - Part II](#)
[Cohort Process Policy for Metaverse Standards Forum Inc.](#)
[Metaverse Standards Forum Domain Group Processes V2](#)