Building 3D Web Interoperability for the Metaverse

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ABSTRACT

This workshop brings together participants from around the world with the goal of building a strong foundation for an open, interoperable Metaverse using the Web and the Web Standards ecosystem. The workshop will focus on four main topics: 1) The variety of relevant Standards and technology roles in the Metaverse stack, 2) the role of the 3D Web Interoperability Working Group, which has recently been chartered in the Metaverse Standards Forum, 3) scoping what the Metaverse IS NOT, and 4) how Use Cases and Scenarios can help clarify what the Metaverse IS. In this emerging space, perspectives and tradeoffs abound; we hope this workshop will push our understanding and terminology forward and also provide the community with an actionable set of common (yet extensible) referents and goals.

KEYWORDS

Metaverse, Open Standards, Interoperability, Web3D, 3D Graphics

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1 INTRODUCTION

This "Building 3D Web Interoperability for the Metaverse" Workshop will provide dedicated face-to-face time to discuss and share the variety of issues and opportunities involved in creating "The Metaverse" - its interoperability, capabilities, and content. Web3D 2022's Keynotes and papers [Havele et al. 2022], and the burst of community activity this year, have provided several aspects for focus as well as vehicles for progress. This groundswell has continued through SIGGRAPH 2023, with words like 'interoperability' finally circulating in conversation and hardware, software, and data standards groups actively working together.

This moment offers myriad opportunities to reckon with lessons-learned from the past and to articulate our vision for the future. It can be argued that 3D Web Metaverses, and numerous specialized "Microverses," have existed since the late 1990s when this conference was founded. These worlds support(ed) millions of users at a time in shared online interactive 3D spaces. Many open source and open standards worlds from that time still exist today and run faster than ever. Graphics Standards and VR and XR hardware have evolved to deliver compelling applications consistently to any connected user across platforms [Polys and Pandey 2023]. Thus, we must consider that this is not necessarily a technological challenge, but perhaps more of a cultural, political, and economic challenge. Sentiments on the Web show that users are frustrated with the fragmentation of their activities across multiple accounts and passwords; they are also increasingly skeptical of the aggregators and social media channels who track their behavior for money, or more nefarious purposes [Lanier 2014]. In this way, Metaverse has a chance to correct the errors in Web 2.0 commercialization, and to create a new user-centered model for the Metaverse.

Specifically, we advocate that the industry orient toward human users and user experience with perspectives and methods such as Usability Engineering [Rosson and Carroll 2001], Scenario-Based Design [Carroll 1997], and User Experience [Hartson and Pyla 2012] to consider and include the diverse range of users and accessibility on the WWW.

Consider, my metaverse transport is PHAT! I have created my favorite vehicle with lights, predictable interaction, and physics. Can I drive it to your Microverse and pick you up (your avatar for the night?). Consider, my cousin sends me a "bookmark" from their last awesome Metaverse concert experience. How do I go there? What do I see?

2 USE CASES: PERSONAS AND SCENARIOS

"Premature Commitment" is a term from organizational psychology for a mental posture that pursues a solution inside a certain frame too early, which unnecessarily constrains the solution space pursued. When humans, designers, and engineers assume a mental frame, they may have efficient heuristics, but these rules-of-thumb simultaneously limit the span of their solution space. This is a common phenomenon that also biases the design of software and Human-Computer Interactions. In contrast, innovations often occur outside or across frames, or when frames are mixed. Therefore, Scenario-Based Design starts with the questions of WHO? and WHY?

Recalling the story of the "Blind Men and the Elephant," we are still understanding what the Metaverse might be. Definitions are still diverse. Questions for workshop participants include:

- Are Scenarios and Use Cases a feasible way to enable common understanding? and
- Can Scenarios and Use Cases feed Functional Requirements (WHAT?) and the design of information and interaction (HOW?)?

3 ECOSYSTEM OF STANDARDS

Appropriate to this conference, we will consider real-time 3D asset interoperability with WWW technologies. Our goal is to Increase

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synergy and reduce duplication of Standards effort, gaps, fragmentation, and confusion, for the good of users and the industry. Topics may include an inventory of patterns for addressable, shareable, 3D assets descriptions across Standards platforms. For example:

- Geometry and material and appearance format capabilities including topology and units / scale.
- Lighting, animation, interaction, reproducible runtime behavior such as direct manipulation, LOD, interpolation, and sequencing.
- Scene composition methods for content-negotiated assets across URI/URLs including Linked Data, Media Fragments, and the Semantic Web.
- Interactive content (webpages) inside the Metaverse and vice versa - mixing 2D and 3D content.
- Representations for WebXR and WebAudio experiences.
- Technologies for 3D graphics compression and streaming.
- Synchronization and Networking.
- Security, Identity, and Privacy.

4 NEXT STEPS

Toward our goals of seamless, interconnected 3D, collaborative, persistent experiences on the Web, we intend to:

- Collaborate with and complement existing Metaverse Standards Forum working and exploratory groups.
- Reach out to diverse tools and communities to experiment with benchmark assets and report back findings and issues.
- Provide an inventory of patterns for Metaverse data representations and linking; Enable robust patterns for interoperable Metaverse content authoring and delivery workflows across the Web.
- A roadmap to meet the gaps: provide members and SDOs clear guidance on future standardization.

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