

An Authorable Metaverse: Personalising Spaces into Places for Social Belonging

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Abstract

An authorable metaverse is one where any user has the agency to not only personalise their avatar, but also the virtual environment around them. Through authorability, metaverse spaces have the potential to transform into places for personal expression, where the individual user is empowered to take an active role in shaping the future of their virtual worlds. However, facilitating authorability invokes design tensions regarding conflicting design needs, wants, and even ethics. We thus propose three design considerations regarding the design roles, safety, and accessibility for implementing a more authorable metaverse.

Keywords

Metaverse, Virtual Reality, Authorability, Accessibility, Virtual Worlds, Design Considerations, Place

1. Introduction

Place attachment describes the emotional, cognitive, and behavioural bonds that people develop with places [1]. However, place attachment is cultivated over time, and in the relatively new metaverse, many have yet to feel a strong sense of belonging. We thus propose to facilitate place attachment by providing every metaverse user the **authorability** – i.e. the ability to change, modify, or create virtual content or spaces – to collectively personalise shared virtual environments. By ‘shared’, we refer to those virtual worlds not only hosted by the developers of a metaverse platform, but also by individuals contributing to the growing network of metaverse spaces. These shared spaces can transform into places for personal expression, where empowering each user to take an active role in shaping the future of their metaverse neighbourhoods or worlds. Thus, collectively, through the cumulative customisations of many users, we envision that space becomes imbued with the attachment, value, identity, memory, and practice of a whole metaverse community – that is, to turn space into place [2].

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Figure 1: Screenshots of various metaverse platforms. From left to right: Rec Rom, Sansar, VRChat, Spatial.io, Horizon Worlds, Mozilla hubs, Virbela, Roblox, No Man’s Sky, and Minecraft. Screenshots are sourced from [7].

2. Authorability in the Metaverse

Currently, metaverse platforms already offer various degrees of authoring its virtual content. Indeed, a qualitative meta-synthesis of the metaverse delineates the importance of authorability [3] in providing the agency to create or customise avatar skins, collectables, virtual assets, and so on [4]. Some platforms are affiliated with the blockchain, providing the content creator the means to claim ownership, and therefore value, of their content [5]. Table 1 provides a brief overview of the levels of authorability offered by a sample of some of the more customisable metaverse platforms today. Importantly, authorability allows users to claim a sense of belonging, to personalise their environment to better represent themselves. As such, creating a more authorable metaverse would potentially allow for a more inclusive one, fostering a greater sense of belonging through participatory space creation and customisation.

However, these metaverse platforms have the tendency either offer too little or too much authorability. Too little authorability restricts users from modifying what the metaverse designer has provided them. Too much authorability risks becoming uncontrollable, in which users can create anything including inappropriate. In 2010, for example, *Lego Universe* initiated as an open world, creativity-driven game where users had the agency to freely build the world around them. However, *Lego Universe* was closed two years later because users created explicit objects that, despite the developers’ attempts at censoring them, were persistently made in increasingly creative ways to avoid the algorithm’s censorship yet still enable the explicit object to be seen from specific perspectives [6]. Nevertheless, metaverse platforms today yet offer various degrees of authorability, as shown in Table 1.

Therefore, how do we design for an authorable metaverse that offers both freedom and safety for user customisation? For self-expression, the metaverse should empower users to freely create and thus take ownership of their surroundings, especially considering that the metaverse offers virtually limitless space and unconstrained creative potential. For ethical reasons, mature, graphic, or controversial content should be managed – but not necessarily fully censored, as an inclusive metaverse should offer spaces for diverse user needs or preferences. Taking a step further, in addition to balancing creative power and ethical protocols, the metaverse should also enable users to customise their spaces for better ergonomics, accessibility, and user preferences at large.

<i>platform</i>	<i>authorability</i>
Minecraft VR	Offers sandbox-level authorability of virtual worlds, where even public servers offer any visitor some level of authorability.
Mozilla Hubs, Roblox	Offers fully or partial open-source level authorability of creating virtual worlds. Although published worlds are not authorable by visiting users, any user has a large degree of freedom to create their own world.
VRChat, Rec Room, Spatial.io, Sansar, Horizon Worlds	Allows any user to create their own virtual worlds within the customisation capabilities provided by the developers. Although published worlds are not authorable by visiting users, any user may author a new world.
No Man's Sky VR	Allows any user to create building structures and modify the terrain in an existing virtual universe. Some developer-designated areas, i.e. the Nexus, are not authorable.
Virbela	Provides solutions where customers can request customisable offices, campuses, etc. A visitor may not author an existing virtual campus.

Table 1

The authorability of a sample of metaverse platforms, listed in descending levels of authorability.

3. Design Considerations

In exploratory investigations, we visited each of the ten metaverse platforms listed in Table 1, spending at least 15 minutes in an interior environment, 15 minutes in an exterior environment, and approximately one hour free-roaming. We observed that tensions began to emerge between different user needs and preferences. These included, for example, the tension between the 'owner' or 'creator' of an existing metaverse space and its visiting users, the tension between different user privileges or expectations in behaviour, or the tension between conflicting design interests. Thus, we aim to address the mediation of these potential design tensions when implementing an authorable metaverse. As such, we propose that a user's agency and capacity to author their environment should reflect on the following design considerations: (1) Roles, (2) Safety, and (3) Accessibility.

3.1. Roles

We propose that the extent to which users may author their environment should depend on their role within the metaverse space. The type, bounds, and scale of virtual space a user may author is shaped by their role, i.e. purpose, when interacting with their environment.

To discuss how role-dependent authorability potentially unravels within the example of a 'metaverse theatre', the role of a visiting user may be divided into performer or audience. A user with a performer role could have the agency to author anything and everything with the stage space. This enables performers to flexibly change the atmosphere and the stage design to contribute to their performance. In contrast, a user with an audience role could have the

agency to author only their seating area, e.g., to change their seat location for a better view or enhance the privacy of their seating booth. Further taking advantage of the ease of customising virtual spaces compared to physical spaces, the ‘stage space’ does not need to be confined to a designated platform, but may also extend into the audience hall itself. For example, a underwater-themed stage set could virtually submerge their audience in the ocean, facilitating narrative immersion. However, the roles of performer and audience should not be fixed, but also consider interchangeability. For instance, during participatory performances, performers may call for audience members to be part of the show, temporarily giving these users the authorability of a ‘performer’ for the duration of their participation.

3.2. Safety

We propose to lend users the agency to selectively visualise and censor (parts of) virtual spaces. Selective authorability adopts a bottom-up approach in the moderation of inappropriate content, where users are empowered to attend to their perceived safety.

Selective authorability extends upon the currently implemented concept of avatar safety systems in metaverse platforms such as VRChat. Avatar safety systems enable multiple users to view the same virtual object but see different levels of detail, e.g., a user may select their privacy settings so that the avatars of friends are visualised while those of strangers are not, or a user may selectively choose to hide details of avatars they find discomforting to see [8]. We propose that not only applicable to avatars but also to *spaces*, selective authorability could provide users the agency to determine themselves where, when, and how they see the various environments that may be distracting or perceived as inappropriate, or even malicious in the wrong contexts. Selective authorability could also incorporate a ‘trust rank’ system, e.g., implemented in VRChat for avatars [8], in which virtual worlds that have a higher trust rating – determined by factors such as the duration that this virtual world has persisted for or feedback from visitors of that world – are visible to all users. In contrast, virtual worlds with a lower trust rating would have more abstracted and ‘hidden’ environmental features until explicit consent is given by the visiting user to view such spaces. Taking selective authorability a step further, perhaps an algorithm could learn from the selection of environmental features that the user has chosen to hide and automatically apply a recommended censorship.

3.3. Accessibility

We propose to lend users the agency to asymmetrically customise virtual spaces to better meet their accessibility needs. By ‘asymmetric’, we refer to private customisations that are only visible to the user and not to others within the same environment.

Similar to text accessibility or eye sensitivity features for standard 2D web design – e.g., high contrast mode, blue light filter, or screen-reading – 3D versions of these features should be translated for metaverse spaces. Perhaps these could be visualised as a filter, e.g., a blue light filter implemented on the view port of the avatar. Alternatively, these accessibility features could be implemented more diegetically, i.e. embedded within the narrative of the virtual world [9], by controlling the time of day or the weather to author the brightness of the virtual environment. Especially for users with visual impairments, e.g., between those with sight loss

and those without, the materials of the metaverse space can be perceived in high-contrast and without. As another example with audio impairments, between users with and without hearing loss, the sound volume may also be experienced asymmetrically. Considering that designing for accessibility is one of the most difficult challenges to address in designing spaces in the real world, customisation asymmetry offers a seamless solution to tailor the environment for each individual. Customisation asymmetry even has the potential to resolve contradictory design solutions. For example, a user with light sensitivity and another with sight loss benefit from dimmer and brighter light, respectively.

4. Limitations

However, there are limitations to the proposed design considerations. For example, with customisation asymmetry, users may have difficulty sharing their experiences with each other if they are seeing asymmetrically different objects. If one user has a red vase and for another user this vase is blue – or something completely different, e.g., the vase is seen as a dog – this can potentially generate confusion during conversations or even the navigation of virtual environments.

In contrast, selective authorability, used for the purposes of environmental censorship, presents a different problem regarding perceived safety. For an environment to be deemed inappropriate, the user would presumably have to see such inappropriate content in the first place. Perhaps this ‘first contact’ with new virtual spaces could be mitigated through trust ranking systems, where users can refer to the feedback of others who have already explored the virtual world to decide whether they wish to explore further.

Additionally, there are further design tensions to consider when regarding the ownership of personalised content. When individuals personalise their environment in real life, these changes to the environment exist in reality. However, when metaverse users personalise their environment, their customisations exist on the metaverse company’s servers, cloud, or somewhere in the blockchain. Once the metaverse company is gone, e.g., AltspaceVR which ceased operation in 10/3/2023 [10] and Mozilla Hubs which plans on closing in 31/5/2024 [11], what happens to the users’ customised content? To truly take ownership of their spaces, perhaps the answer lies within the idea of the decentralised metaverse, i.e. without central authority, where ownership lies with the users instead of the platform owners [12].

5. Conclusion

Empowering users to author their environment has the potential to simulate their creative freedom, self-expression, and a sense of belonging through the process of personalisation. However, enabling authorability also risks generating design tensions regarding conflicting design intentions between different users, the moderation of potentially inappropriate content, and visualising shared spaces for users with diverse accessibility needs. We propose three approaches for how metaverse developers can mediate these design tensions: to leverage the extent to which users may author an environment depending on their role within the metaverse space; to empower users with the ability to selectively censor environmental features for

bottom-up moderation; and to allow users to asymmetrically customise the environment to better meet their accessibility needs. We envision that authorability, enabled through careful design considerations, can provoke a highly creative, customisable, inclusive, and accessible metaverse – one that is collectively authored over time by the very users who are using it, personalising spaces into places imbued with memory, identity, and attachment.

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