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IDENTITY AND INSTITUTIONAL WORK IN THE METAVERSE

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MICHAEL F. PRICE COLLEGE OF BUSINESS

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ABSTRACT

Metaverse platforms, complemented by virtual reality (VR) technology, are rapidly emerging as a new and captivating phenomenon, attracting a range of individuals to this uncharted domain. To gain a deeper understanding of the metaverse platforms, I examine it from both individual and institutional perspectives. At the individual level, self-presentation poses a continuous challenge, as it influences how others perceive and accept us in social contexts. Platforms like social media and virtual worlds offer opportunities for self-presentation through user profiles and avatars. However, the expanding digital technologies underpinning evolving metaverse platforms introduce new options and uncertainties in self-presentations. Alongside platform features, VR capabilities and user-created worlds contribute to the complex landscape of self-presentation, leading to uncertainties for both individuals presenting themselves and those observing them. This research investigates the nature of layered affordances for self-presentation in metaverse platforms and explores how individuals navigate these uncertainties through identity work. By utilizing a netnography of the VRChat platform, we gain insights into the risks associated with self-presentation and the subsequent formation of identity in dynamic metaverse platforms. At the institutional level, a persistent challenge for information systems researchers is promoting the adoption of technological innovations that rely on the adoption and usage of others, known as network externalities. Previous studies have linked the adoption of network innovations to existing adopter networks or influenced networks through incentives. However, diffusion of network innovations becomes particularly challenging in the absence of

existing networks and financial incentives. One such network innovation is the Metaverse Church. Using an institutional work perspective, we investigate the practices associated with building a diverse actor network to facilitate the diffusion of this network innovation. By conducting an immersive, netnographic study in metaverse platforms, we identify five practices that contribute to forming an actor network for the diffusion of network innovations: conscripting a non-human actant as foe and envisioning the metaverse as inevitable for projective agency, practicing socio-technical inclusiveness for managing exigencies, and building community and fostering generosity for developing habits. While this investigation centers around the Metaverse Church, the findings have broader implications for researchers studying various types of network innovations.

1. INTRODUCTION

The Metaverse is a hyperreal space on a digital plane that enables communication and interaction among users (Weking et al. 2023). *Hyperreality* of a mediated society is a state wherein the real and the simulated are indistinguishable (Baudrillard 1976). In the Metaverse, users explore a "massively scaled and interoperable network of real-time rendered 3D virtual worlds that can be experienced synchronously and persistently by an effectively unlimited number of users with an individual sense of presence, and with continuity of data, such as identity, history, entitlements, objects, communications, and payments" (Ball 2021, p. 42). Ball (2021) notes that this vision for a singular "Metaverse" has yet to be realized. Instead, there currently are multiple platforms that provide metaverse experiences and vendors are competing to define what a metaverse experience entails (Lacity et al. 2023). The recent release of Apple's Vision Pro referred to their headset's experience to "spatial computing" rather than virtual reality, artificial/mixed reality, or a metaverse experience.

Metaverses can be experienced through a variety of devices such as smartphones or gaming consoles like Play Station or Xbox. However, the entry-level hyperreal virtual reality (VR) metaverse experience requires VR headset and controllers (Forbes 2023). A metaverse epitomizes experiential computing, in which all four dimensions of human experience – time, space, actors, and artifacts – are mediated (Yoo 2010). Unlike earlier virtual worlds, metaverse platforms also offer an unprecedented form of hyperreal experiential computing wherein virtual and physical worlds complement and collide with one another. To develop an understanding of metaverses and how they relate to earlier

virtual worlds, I begin by considering extant research on virtual worlds. Table 1 provides a brief overview of this literature. It highlights the differences between the concept before metaverse platforms gained popularity and the actual experiences of metaverse platforms nowadays. Indeed, the concept of the metaverse has undergone significant changes since its inception, especially considering the limitations of technology at different time periods. While the idea of the metaverse existed before the widespread availability of consumer virtual reality headsets, the practical realization of the concept has evolved alongside technological advancements. Without consumer VR headsets, early attempts at creating metaverse-like experiences relied on other technologies. These included online multiplayer games, virtual worlds, and social platforms. Examples include Second Life, Habbo Hotel, and MMORPGs (Massively Multiplayer Online Role-Playing Games) like World of Warcraft.

With the advent of consumer-grade virtual reality headsets in recent years, the metaverse concept has gained new dimensions. Modern metaverse platforms have embraced virtual reality as a key component. They leverage VR headsets to create immersive social experiences, virtual gatherings, virtual marketplaces, and other interactive activities. Additionally, the evolution of metaverse platforms has expanded beyond gaming and entertainment. The metaverse concept continues to evolve, and different interpretations and implementations exist. While the current metaverse platforms may not fully match the grand vision of a fully realized metaverse, they represent steps toward creating immersive, interconnected virtual spaces.

Table 1. Brief Overview of Literature on the Virtual Worlds

Authors	Summary	Comparative discrepancy from metaverse platform experiences nowadays
Suh et al. (2011)	Users assume avatar identities and interact in virtual worlds. Attitudes and intentions towards avatars are influenced by dual congruity (self-congruity and functional congruity). Users tend to have positive attitudes (affection, connection, passion) and evaluate apparel products better when avatars closely resemble them. This applies to virtual apparel shopping, matchmaking, plastic surgery, and fitness clubs.	In VR Dance Academy, one of the Groups in VRChat, individuals have the freedom to present themselves in the way they desire or prefer within the virtual environment. There is an assumption that people will carry their virtual experiences back into the real world. However, it is important to note that not everyone may view the virtual world as a separate community and may instead see it as an extension of their offline activities. This perspective can lead to a desire for additional group activities, similar to students going to extra curricular learning academies.
Nah et al. (2011)	The effects of using 2D and 3D virtual world environments on telepresence, enjoyment, brand equity, and behavioral intention are examined using flow, telepresence, positive emotions, and brand equity theories. While the 3D environment has the potential to enhance brand equity through immersive and enjoyable virtual experiences, the complexity can also be distracting. It is important to consider users' information processing capacity and attention span to avoid cognitive overload when designing the virtual world.	In this research, the comparison was not made between a 2D world and a 3D world. Rather, it was between a 3D experience on a flat screen and the virtual reality (VR) space experience. The 3D experience on a flat screen differs significantly from the immersive nature of VR.
Goel et al. (2011)	Researchers adopt the interactionist theory of place attachment to build their model. It suggests that users are more likely to return to a virtual world if they perceive it as a meaningful place where they had significant experiences. They	Cognition played a crucial role in the past 3D worlds, where users had to select a computer to log into Second Life and navigate the virtual environment on a screen. Communication was limited to text-based interactions. However, with

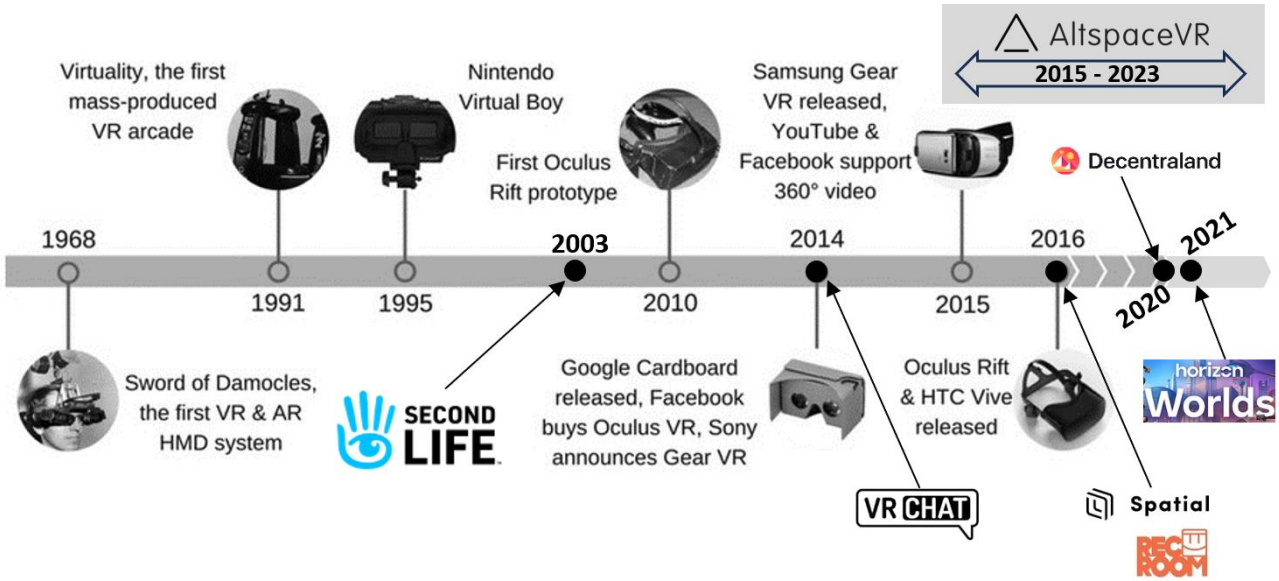
	conducted a lab experiment and found that the depth of users' involvement, measured by cognitive absorption, played a crucial role in their intention to return. The more deeply engaged they were to the point of losing track of time, the stronger their intention to return. Additionally, the awareness of the social, contextual, and interactive aspects of the virtual environment also influenced cognitive absorption.	the advancement of virtual reality (VR), the immersion level has significantly increased. Users now feel like they are actually present and engaged in conversations with others. In VR, the actions of the avatar, including hand movements, are more realistic, thanks to motion trackers. This results in a significantly enhanced level of immersion compared to traditional 3D worlds.
Kohler et al. (2011)	The researchers examined Osram's attempt to gather lighting feedback in Second Life, finding low participation. They conducted 20 months of action research and discovered the importance of user experience in co-creation systems. Real-time conversation enhanced the experience, while establishing a community with shared consciousness and support was vital. Key lessons involved interactive objects, inspiring design, and immersive environments; attracting critical mass and promoting collaboration; ensuring usability and providing hedonistic elements; and involving users in co-creating the system based on feedback. These insights aimed to design vibrant virtual places for meaningful connections, creativity, and co-creation.	Co-creation in different contexts often comes with various incentives. In a church setting, individuals may gain spiritual interactions, a sense of community, and a deeper connection to their faith. In a dance academy, participants can benefit from financial rewards, improved dance skills, and enhanced memory. Additionally, some individuals may acquire knowledge and expertise in avatar designing or world creation. Building friendships and making connections are also common outcomes of co-creation experiences. When these incentives are present, individuals are less likely to feel exploited by the company and instead perceive mutual benefits from their involvement.
Animesh et al. (2011)	In virtual worlds, the environment and social interactions influence purchase behaviors. Interactivity, driven by technological features and enhanced object interactivity, plays a crucial role, positively impacting telepresence and flow. Sociability is strongly associated with social presence. Density and stability create strong social bonds, increasing presence and flow.	Having a large number of people in one place can indeed decrease the experience for VR users, just as it can in physical worlds. In both cases, overcrowding can lead to issues such as limited personal space, difficulty in interacting with others, and a decrease in overall immersion. This suggests that the dynamics of interaction in virtual worlds and physical worlds are not

	However, while density enhances social presence, it can reduce flow. These findings align with the S-O-R (stimulus, organism, response) framework proposed by Bitner (1992) Williams and Dargel (2004).	fundamentally different for individuals. Both environments can be affected by the presence of too many people, resulting in a potentially diminished experience for the participants.
Roquilly (2011)	The author examines game companies' control over virtual worlds, addressing user rights, power dynamics, and legal challenges. Recommendations for transparency, fairness, and user empowerment are provided, including clear user rights, participation mechanisms, and external oversight. The research highlights the complexities of control and offers suggestions for a more balanced and equitable relationship between game companies and users.	The discussion centers on wearing versus being avatars in virtual worlds. "Wearing" avatars involves using them for self-expression, while "being" avatars suggests a deeper immersion and identification. Some argue that virtual experiences create a strong connection between users and avatars, while others see avatars as mere tools for interaction. This debate explores identity in virtual environments and the transformative effects of embodying avatars. It also acknowledges the varying levels of engagement and immersion users experience in virtual worlds.
Chaturvedi et al. (2011)	The authors examine design principles for virtual worlds, emphasizing the need for immersive environments that support emergent knowledge processes. They propose their own virtual world, Sentient World, combining modeling and simulation structures with user interactions. Key characteristics of agent-based virtual worlds are discussed, including augmentation-simulation and external-intimate features. Realistic simulations and incorporation of social and economic systems are highlighted. The research offers insights into designing effective virtual worlds for user engagement and knowledge creation.	The concept of agency in VR raises questions about whether VR itself is an agent or simply a graphical representation of the user. The distinction between the virtual self and the real self becomes blurred and uncertain. The boundaries between the user and the virtual environment are invaded and smudged, challenging traditional notions of agency. This ambiguity prompts a deeper exploration of the nature of agency in VR and the ways in which users perceive and interact with virtual environments.

Berente et al. (2011)	The study delves into the sensemaking process and the construction of perspectives regarding the organizational value of virtual worlds. This sensemaking is achieved through discursive methods such as confirmation, open-ended rhetoric, demographics, and control. The analysis of different types of claims using Toulminian analysis reveals the intricate dynamics at play. By exploring these aspects, the research sheds light on how individuals make sense of virtual worlds and form their perspectives on their organizational significance.	The quote stating that "games come and go. So will SL. They don't hold value" reflects a logical and realistic perspective. It highlights the transient nature of virtual worlds like Second Life (SL) and raises concerns about their long-term value. The absence of sufficient control over virtual worlds is seen as a significant barrier to their adoption by organizations. This lack of control can limit the stability, reliability, and perceived value of virtual worlds as platforms for business or organizational purposes.
Schultze (2016a)	The study seeks to understand how identities are performed via avatars by comparing real-world identity performances with virtual identities. The author emphasizes the significance of digital bodies, or avatars, in shaping identity performance. The data was collected in two phases through face-to-face and phone interviews with participants who experimented with Second Life. The analysis was conducted using excerpts from interviews and photodiaries.	In Second Life, the avatar's overall body movements are disconnected from the real-world person's arm and hand movements, not to mention other body parts. Therefore, the level of immersion is very different compared to other avatars or platforms, such as metaverse platforms. Additionally, the data was collected solely based on the stories and experiences shared by the interviewees with the interviewer. However, in metaverse platforms, real-time interactions include various cues from body movements, hand gestures, and even facial expressions. There is a significant difference in the level of experience between using a fully immersive avatar (synced with real-life body movements) in metaverse platforms compared to a static gaming avatar displayed on a screen.

Metaverse platforms (e.g., VRChat, Horizon World, the now defunct AltspaceVR, RecRoom, Spatial) also offer many more opportunities than did conventional virtual worlds (e.g., MMORPGs without VR). Users across all age groups worldwide primarily enjoyed metaverse platforms for entertainment purposes for virtual music concerts, virtual international travel, virtual museums, playing games, and socializing with friends (Statista 2022). Metaverse platforms can be used for productivity, and it has been gathering attention since the recent pandemic that changed the work environment and dynamics (McKendrick 2022). Remote work ranges from attending a virtual work conference and collaborating with colleagues in a virtual office (Statista 2022) to location-agnostic hiring of fully- or partially- virtual organization such as the public relations firm Rosica Communications, global brand for footwear Merrell, and Global Talent Mobility platform Topia (McKendrick 2022). The future of the metaverse has the potential to project a new form of landscape. Tuvalu, a microstate country situated in the South Pacific between Hawaii and Australia, is experiencing an existential threat from climate change within the next 80 years (Cramer 2022). To preserve its rich cultural heritage and landscapes, their government is creating a digital twin of the country in a metaverse platform to become the world's first digital nation (Channel 4 News 2022). Figure 1 shows the evolution of VR devices and social VR games in chronological order (Molnár 2017, p. 105).

Figure 1. Milestones in the history of VR devices and social VR games



Nonetheless, the technology is not without its problems. One problem in metaverse platforms is choosing and performing one's identity, i.e., selecting one's avatar and engaging with the platform through that avatar. In this regard, metaverse platforms are similar to prior virtual worlds such as Second Life. In Second Life, the avatar with a different name and appearance from the in-real-life (IRL) physical embodiment of the player acts as a displayable self that has a unique style and persona, ready to exist as is and explore in the virtual world (Schultze 2016b). However, rather than being a virtual reality, the Metaverse is a hyperreality, wherein virtual becomes indistinguishable from the real. What typically sets the boundary of a digital and real is the five senses: visual, auditory, olfactory, tactile, and gustatory. VR is leaping forward to breaking the boundaries by enabling all senses in addition to the current visual and auditory availability not having to rely on pseudo senses such as phantom touch (Alexdottir and Yang 2022). From simply using touch-enabled gloves or body suit to having electric signals converted into the sense

of taste (Azcárate 2022) or smell (NBC News 2022) are good examples. These extraordinary immersive experiences can only be sought in the expense of extra accessories or devices to use along with the basic VR headset and controllers that are as expensive as the initial investment. The IRL financial impacts to seek an immersive experience in the Metaverse sometimes wander to the extreme. The authenticity of the virtual world's experience may call for an overtly dangerous interaction. Founder of the VR company Oculus, Palmer Luckey's NerveGear VR headset inspired by a Japanese animation can kill people who dies in the game (Sengupta 2022). Yearning for authenticity involves ethical scrutiny in the use of a greater immersion into the VR experience in virtual worlds (Brodsky 2022).

Another problem a metaverse platform encounters is getting people to participate. Adopting new technology has been associated with anxiety (Igbaria and Chakrabarti 1990). This is true also of the virtual/augmented reality technologies necessary for participation on metaverse platforms (Castiblanco Jimenez et al. 2020). Then, while gamers may already have accumulated the necessary resources, participation entails significant startup costs for the non-gamer (Forbes 2023). These include purchasing a set of VR headset and controllers that cost $299.99 the cheapest, which was for the case of the 128GB Oculus Quest 2 (now known as the Meta Quest 2). Furthermore, the learning curve is steep. First, the user needs to overcome the first hurdle of motion sickness, i.e., headaches and nausea, in VR especially from poorly designed worlds (Caserman et al. 2021). Next comes the navigation and finding of a preferred avatar, getting used to the controllers and options menu, and dealing with users with malicious intent to crash others with lower-level technology with cheaper graphic cards (McGill et al. 2020).

Participation is a diffusion problem, specifically, diffusion of a network innovation. Returns to a decision to invest in the technologies necessary for participation in the Metaverse accrue only when others also participate. Promoting the adoption of technology innovations in situations where their benefits are contingent on others' adoption and use, i.e., when the innovation is subject to network externalities, is an enduring information systems problem. Prior research has highlighted the relationship between network size and adoption. These networks have typically been subject to the prospective adopter's fiat or financial incentives (Kauffman et al. 2000) or have been the pre-existing network of adopters (Zhu et al. 2006). However, the diffusion of innovations subject to network externalities poses a significant challenge when the network is not subject to fiat or financial incentive and does not already exist.

I therefore address two distinct problems in my dissertation. Because it is not possible to enter the metaverse without an avatar, first, I investigate how actors navigate personal identities in a metaverse. Given the disparate technologies and technological affordances (e.g., that constitute metaverse experiences, opportunities for "slippage" in identity performances abound as actors cull together diverse affordances into their performances. Given the foundational nature of identity performances to human interaction (Goffman 1959), understanding the potentialities of metaverse platforms must commence with an understanding of its affordances for identity performance. This portion of my investigation contributes to the stream of research on identity performance in less complex virtual spaces such as Second Life (e.g., Schultze 2010; Schultze and Orlikowski 2010).

Second, I investigate the diffusion of a metaverse application as a network innovation. As noted earlier, there are many use cases for the Metaverse (e.g., virtual work environment during the pandemic, virtual government of Tuvalu to preserve their country). Some, such as entertainment, education and training, and work meetings can be incentivized based on individual incentives and fiat. Others present a thorny collective action problem, requiring the mobilization of technology use by diverse actors in order to reap benefits from the technology. One such use case is religion – specifically, the digital church. The digital church is a recent phenomenon wherein some evangelical Christian pastors have been trying to harness Metaverse affordances toward extending their reach. Because these pastors initially lacked the support of their ministries – in fact, were often opposed by them – they did not have an extant network in place from which to mobilize for the collective action necessary for the diffusion of their Metaverse churches (Kelly 2018). This phenomenon therefore provides an excellent opportunity for understanding the diffusion of a network innovation. Though a persistent problem, diffusion of network innovations lacks extensive research, with insights to date being limited to the size of the actual or prospective network of adopters (e.g., Zhu et al. 2006) and the use of fiat and incentives (Kauffman et al. 2000). My dissertation comprises of two full-length research papers based on my netnographic studies in metaverse platforms including but not limited to VRChat. Chapter 2 presents the first study, in which I address the problem of how actors navigate personal identities in a metaverse platform. Chapter 3 presents the second study, in which I address the problem of how a complex network innovation diffuses successfully. In Chapter 4, I then reflect on my experiences with metaverse platforms and with conducting netnographies.

2. IDENTITY WORK AND LIMINALITY FOR THE PRESENTATION OF SELF IN THE METAVERSE

How we present ourselves to others is an ongoing human challenge as others infer our character and intention from our self-presentation (Goffman 1959). From these presentations flow others' judgments of us as competent or not, as credible or not (Goffman 1959). Research on social media and virtual worlds have therefore attended to digital affordances for self-presentation, highlighting, for example, avatars and user profiles as affordances for self-presentation (e.g., Davis et al. 2009; Halpern and Gibbs 2013; Kietzmann et al. 2011; Nardon and Aten 2012; Schultze 2010). Across gaming platforms, the nature of avatars and what they afford differs and users may customize their avatars to be more (or less) congruent with their real or ideal selves (Holtzwart et al. 2022). Noting the inseparability of self and avatar, Schultze (2010) and Schultze and Orlikowski (2010) described individuals' performance of self through avatars. However, virtual worlds are evolving, taking on the properties of digital technologies.

Two properties of digital technologies – modularity and generativity – create a layered set (Yoo et al. 2010) of affordances for self-presentation. Affordances available to a user are no longer a function only of the gaming platform being used, but also of the worlds that other users have built on that platform and of the virtual reality (VR) resources available to her. This layering of affordances brings considerable uncertainty to the user in how their self-presentations will be received. Uncertainty creates moments of liminality – when conventions and rules are suspended and an individual has relatively unlimited freedom with which to present herself (Turner 1982). Such self-presentation in the presence of liminality has been termed identity work (Beech 2011). This research therefore addresses

two questions. The first is: *what are the layered affordances for self-presentation in metaverses?* Answering such descriptive "what" questions is a necessary precursor to follow-on "how" and "why" questions (Bertilsson 2015). The second question is: *what are the identity work practices used to manage the uncertainty surrounding affordances for self-presentation?*

I answer these questions through an immersive 20-month netnography of two metaverse platforms VRChat and AltspaceVR. In this period, I observed and participated in a range of events on AltspaceVR (now defunct) and VRChat platforms. I also conducted a series of semi-structured interviews on the VRChat platform. Our study contributes to our understanding of the evolving metaverse platforms in the digital era and their layered affordances for self-presentation. It also helps us understand the complex nature of the identity work that participants must perform in navigating self-presentation affordances uncertainties.

2.1. Literature Review

Below, I review literatures on self-presentation in virtual worlds, including the metaverse, as well as literatures on affordances for self-presentation. Subsequently, I explore the challenges presented by digital affordances.

2.1.1. Self-Presentation and Identity Work

Goffman (1959)'s concept of self-presentation highlights the performative nature of social interactions. Individuals actively manage their presentations to others to shape how they

are perceived by others in different social situations. Goffman viewed self-presentation from a dramaturgical perspective, comparing social interactions to a theatrical performance, in which individuals are both performer and audience. By carefully crafting their appearance and behavior, individuals-as-actor aim to project a consistent and predictable image to others and avoid giving off discordant cues that undermine their performance. To minimize disruptions of a situation, individuals-as-audience prefer not to receive discordant cues. In this way, individuals strive to minimize ambiguity and uncertainty in a situation. Goffman (1967) also noted that social interactions are oriented toward the mutual maintenance of dignity.

Self-presentation efforts may be considered identity work. Identity work refers to an identity "being constructed and reconstructed through a dynamic interaction in which a person is 'cast' in an identity by others, seeks to project an identity to the outside world and takes on (or enacts) behaviors, symbols and stories of an identity" (Beech 2011, p. 286). Identity work is especially necessary in moments of liminality. Liminality is a transitory situation, "a sort of social limbo" in which "social relations may be discontinued, former rights and obligations are suspended, and the social order may seem to have been turned upside down" (Turner 1982, pp. 24, 27). Beech (2011) identified three liminal identity work practices: experimentation, i.e., trying out different versions of self, reflection entailing questioning oneself, and recognition.

Literature in the IS field has just started incorporating the concept of identity work into research (Boudreau et al. 2014). Table 2 shows a list of journal publications on identity

work in the IS field to date. The search had been done on the Academy of Information Systems (AIS) eLibrary website with a search keyword of "identity work".

Table 2. IS Research on Identity Work

Author	Summary	Comparison to Identity Work in the Metaverse
Boudreau et al. (2014)	An in-depth empirical study has been conducted on the process of identity creation triggered by digitalization of a work environment. Through a longitudinal case study, the authors suggest a technology identification process model that parallels the group identity creation process. They explain how a group identity is created over time by a collective of workers making sense of a new, digital work environment. They define IT as a medium and a determinant.	The sense-making to create a group identity resembles the activities and understanding of the phenomenon in the metaverse via interaction and formation of a community.
Carter and Grover (2015)	This study introduces the concept of IT Identity which the authors deem as what individuals view use of an IT as an extension of self. The authors explain IT as a concept that goes beyond a medium or a consequent.	The use of IT is a means to adequate representation of self, not merely an extension of self. Identity work is not solely through the use of IT, but it exists in combination of multiple affordances in this research.
Stein et al. (2015)	The authors define identity work as a cue, or "the ways in which the individual using the IT" associating it with "particular aspects of their own status, power and performance" (p.379). The authors find that deterrence emotions were prevalent in response to the identity work cues.	Through identity work, people can show which trust rank, what kind of groups they are in, and what avatar they will choose to feel more dominant or beautiful. While in this study deterrence was prevalent, in metaverse platforms, identity work is relatively easily accepted, assuming that people are there to

		express and present themselves.
Thomas et al. (2017)	This study explains how identity work is done among younger people via social media. They found that students put in a considerable amount of time for identity work, enough for themselves to feel comfortable, before making new friends. Self-disclosure, affirmation from a previous community, and self-editing were found to be important factors for identity work.	As metaverse platforms mainly involve social interactions, there is a similarity in how people try to self-disclose, gain affirmation by peers, and self-edit (or modify) through the use of avatars.
Bernardi et al. (2019)	The authors investigate the health systems in Kenya, as case studies, to reveal four types of identity work (disruptive, legitimizing, reinforcing, and transformative) that lead to distinct institutional consequences. The authors conducted multiple interviews and semi-structured interviews along with the interpretive case study approach, and drew conclusions from the analysis of IT affordances and identity literature.	The identity work found here can resemble identity work found in metaverses when people try to engage in self-presentation. Some users try to stand out to express themselves by being disruptive. Then they find ways to legitimize their existence as a certain avatar and reinforce the meaning of having that avatar. Lastly, users in the metaverse try to educate and share knowledge to transform others into a citizen in the metaverse. Hence, thes identity work put in share similarities for possible identity work in the metaverse.
Paul and Cochran (2020)	The authors find how social media forms individual and group identity, and they seek to design, deploy, and validate new survey instruments for research.	The salience to identity formation through social media can be modified and replicated for the activities taking place and interactions occurring in metaverse platforms.
Riemenschneider and Armstrong (2021)	The authors seek to find an identity with respect to the IS profession. They collected focus group interviews and surveys in two separate studies. They find a perceived distinctiveness of IS	Identity within the metaverse, as a citizen of the metaverse, shows resemblance to this study. Forming Metaverse

	profession and its influence on IS professional identity. They branch out their research from Carter and Grover (2015) to expand on the IT Identity literature.	identities through identity work. The different is that the IR professionals' identity is an extension of self rather than a separate entity like the ones in metaverse platforms.
Vaast and Pinsonneault (2021)	The authors investigate online communities dedicated to data science. They find what kind of identity work takes place in creation of an occupational identity associated with digital technologies that enable and threaten their occupational identity.	The active engaging in "forming, repairing, maintaining, strengthening or revising of constructions" (Sveningsson and Alvesson 2003, p. 1165) occurs in the metaverse. Identity work described in this research greatly resembles the identity work taking place in metaverse platforms.
Marx et al. (2023)	The authors delve into digital nomadism and how people explore identity work. The authors use semi-structured interviews to introduce corporate nomadism and redefine the concept of home offices. The authors find nine salient identity issues (social separation, environmental distraction, accessibility expectations, holding multiple contradictory identities, disproportionate personal growth, a flexibility paradox, savings-salary gaps, the point of no remote-return, and collaboration constraints).	Reflecting the use of home offices and meetings held in virtual spaces or the metaverses, most of the salient identity issues seem relevant to what might happen in metaverse environments.

2.1.2. Self-Presentation in the Metaverse

Self-presentation in a metaverse serves as an extension of the real-life self. It fulfils the need for validation that may not have been attainable in offline life (Elias and Gill 2018; Zhao 2005). As a result, self-presentation in a metaverse is significant to people (McCreery

et al. 2012; Sheth and Solomon 2014). Self-presentation goes beyond uploading a nice selfie as a profile picture though the attractiveness of the selfie itself can construe a successful digital self-representation (Yee and Bailenson 2007). Self-presentation relates to the social presence of a communication medium (Huang et al. 2017). The presentation of an ideal self by a user in their virtual world is constrained by the technological capabilities available within the virtual space (Barr et al. 2006). Presenting oneself in virtual space involves multi-dimensional consideration (Barr et al. 2006). This does not exempt anyone who desires to exist in the metaverse, regardless of their age group or the activities they are involved in. One dimension that has been extensively researched is the avatar.

Davis et al. (2009, p. 93) defined *avatars* as "user-created digital representation that symbolizes the user's presence in a metaverse". The presence of an avatar in the metaverse encompasses not only its appearance but also the surrounding environment and interactions with others. These elements collectively contribute to the overall sense of presence in the virtual world (Bailenson et al. 2003; Biocca et al. 2003; Blascovich et al. 2002; Chaturvedi et al. 2011; Lombard and Ditton 1997). Robinson (2007, p. 99) asserted that "the cyberself seeks re-embodiment as a means of identity", implying that individuals strive to find avatars that closely align with their own identity and enable a sense of embodiment in the virtual world. Research on avatar appearance indicates that when an avatar shares similarities with its user, the user tends to perceive the avatar more positively. This is because of the dual-congruity, i.e., alignment of the avatar with the user's self-identity and the suitability of the avatar for its intended purposes (Kampling 2018, p. 1399; Suh et al. 2011). However, this may not hold true when the use of avatars expands

beyond mere appearance and incorporates additional dimensions. For example, metaverses permit people with disabilities to eschew their disabilities in virtual space (Whang and Miranda 2023). Yee and Bailenson (2009) argued that when users opt for avatars that differ greatly from their real-life appearance, they often select ones that they find more attractive than their actual selves.

The meaning and value attributed to avatars are subjective and can differ among users based on their personal experiences, motivations, and desired outcomes in the metaverse. Belk (2013) argued that it is noteworthy when people regard avatars as *possessions* versus as part of self. In their quest for immersion, individuals strive to establish a cohesive narrative between their real-life self and their virtual self. As users align the narrative between their real-world self and their digital avatar, the discrepancy between the two selves begins to diminish. This process, referred to as *dematerialization* by Belk (2016), involves the reduction of the gap between the core self and the extended self in the virtual space. Regardless of the level of similarity in appearances, individuals develop a sense of attachment to their avatars and a desire for re-embodiment, further blurring the boundaries between the real and virtual selves. This phenomenon highlights the transformative power of the metaverse in shaping users' identities and fostering a deep sense of connection to their digital personas.

Extending the self into the virtual space mirrors the process of extending one's presence and identity into different social groups in society. This allows varied roles and a sense of affiliation. Interactions and encounters in the virtual world have an impact on the offline

self, sometimes even causing anxiety. As individuals actively engage and communicate with others in the virtual realm, the experiences and relationships formed can influence their offline self-perception and emotions. This also highlights the interconnectedness between the digital and physical realms and the potential psychological effects of virtual interactions (Wood et al. 2016). The coexistence of the real-world self and the virtual self leads to a co-construction of the self as a whole, forming an "aggregate extended self" (Belk 2016, p. 52). Schultze and Leahy (2009) noted that experienced users of Second Life often regarded their virtual jobs and roles as distinct identities separate from their real-world personas. This means that they made a clear distinction between their online selves and their offline selves. Schultze (2016a) later proposed the *cyborgian self*. Cyborgian self is a combination of the selves in the virtual and actual reality. In the virtual space, the cyborgian self engages in continuous self-reflection (Schultze 2016a). It actively seeks validation from others to reaffirm the avatar as an extension of their identity. The availability of multiple avatar versions per user grants users freedom to vary their self-presentation, permitting customization to disparate social scenarios. Chen (2016) proposed that people engage in these interactions through digital construction, where they create and customize their virtual presence. They employ strategies for self-presentation in the digital realm to shape how they are perceived by others. Additionally, they form parasocial relationships with others, building connections based on their projected self-images. These elements collectively influence their experiences and interactions within the virtual space.

2.1.3. Affordances for Self-Presentation

Affordances are the potential actions and interactions that a technology offers users (Gibson 1977). Researchers have noted several technology affordances for self-presentation (Karahanna et al. 2018). For example, Kietzmann et al. (2011) and Halpern and Gibbs (2013) noted the social media affordance for identifying oneself via profile information. Likewise, Mesgari and Faraj (2012) described the Wikipedia affordance for presenting a desired personal image. Davis et al. (2009) and Nardon and Aten (2012) described the affordance for rendering or creating avatars to represent oneself in virtual worlds. Similarly, Schultze (2010) and Schultze and Orlikowski (2010) described individuals' performance of self through avatars. Ma and Agarwal (2007) viewed screennames as an affordance for self-presentation. Additionally, Majchrzak et al. (2013) described social media affordances for generative role taking, i.e., for performing patterned actions that come to be associated with specific roles. And Junglas et al. (2013) described affordances for representing social settings as available to presenting oneself – for example, taking the podium in a classroom world as representing oneself as a teacher.

2.1.4. Affordances of Digital Technologies

Our digital world has made online spaces more complex. Two specific properties of digital technologies create complexity and consequent uncertainty in understanding affordances in evolving metaverse platforms. First, *modularity* means that a given technology relies on other technologies and implies a plug-and-play/mix-and-match dynamic (Yoo 2013). For example, iPhone users can use Airpods or Bose EarBuds; Samsung Galaxy users can use Samsung Galaxy Buds or Bose EarBuds. Existing metaverses rely on virtual reality gear.

VRChat users can use Sony PlayStation VR headsets of 960 x 1080 pixels with basic hand controllers or HTC Vive Pro 2 headsets of 4896 x 2448 pixels with Valve Index controllers that allow delicate finger motion tracking; a Meta Quest 2 headset can be interchangeably used with Quest Pro Controllers or Valve Index Controllers. nature and quality of this gear expands or limits platform affordances.

Second, *generativity* means that digital technologies can give rise to change, including the development of other technologies (Yoo 2013). For example, the Internet gave rise to online file-sharing and eCommerce (Zittrain 2006). In the use cases being developed for metaverses, innovators are likewise building out functionality and affordances of the platforms (Nickerson et al. 2022). Generativity further permits diverse purposing of the same set of affordances by different actors, compounding uncertainty. For example, one website designer may use JavaScript to harvest personal user data, while another may use it to protect users' identity. Or one metaverse user may use Unity[1] to optimize an avatar, while another may use it to add an excessive number of polygons[2] to downgrade the optimization. These two features thus create a layered set of affordances for self-presentation (Yoo et al. 2010). This layering creates uncertainty over the affordances available and how presentations may be interpreted in the light of affordance uncertainty.

[1] Unity is a free programming language used for 3-dimensional (3D) graphics and projects that involves creating online worlds or avatars. VRChat adopts this programming language for themselves as well as the users to create contents in VRChat.

[2] Polygon, or polygon mesh is a component and technique used in creating 3D modeled computer graphics. It comprised of vertices, edges, and faces defining the shape and surface of a 3D object. It is used as a basis for any computer-aided designs (CAD) such as computer games, virtual reality, or animation.

2.2. Methods

I used a netnographic approach, i.e., a digital ethnography (Califf and Stumpf), to understand affordances for self-presentation available in the metaverse, the moments of liminality that ensue from them, and the identity work users perform in those moments or to preclude them. Netnography allows researchers to leverage the vast amount of digital information available online. When applied to virtual reality, netnography recognizes the virtual experience as a distinct "place" or "space" for analysis. By delving into this digital environment, researchers can gain valuable insights into user behaviors and interactions.

Platforms like Second Life and VRChat differ widely in their affordances for self-presentation, enabling or constraining not only the range of visual features that users may appropriate in choosing or constructing their avatars, but also what performances are permitted to those avatars. Though some observation took place on the now-defunct AltspaceVR platform[3], I therefore contextualize our investigation to the primary platform studied – VRChat, on which most observations and interviews took place. VRChat is a prominent VR-enabled metaverse platform within the Metaverse. At its launch in 2016, the platform targeted an adult audience and required users to purchase multiple devices to access games. Since then, VRChat attracted a significant number of gamers and programmers who invested extensive amounts of time in the game, leading to the development of highly personalized assets. The VRChat Software Development Kit (SDK) allows users to create interactive worlds and avatars based on Unity, a free 3D game

[3] AltspaceVR has been defunct since March 10th, 2023.

engine. This lowered the barriers to entry relative to other platforms such as Second Life. According to similarweb.com, Second Life had 11 million visitors to its site in May 2023, while VRChat had 7.3 million; however, 80% of VRChat users are less than 34 years of age, compared to 57% of Second Life users, indicating broader appeal with the younger demographic. Compared to Second Life, VRChat offers a more immersive experience, with greater versatility for content creation, including creating and sharing virtual worlds and avatars at no cost. VRChat was therefore selected for research purposes because it most closely resembles the envisioned concept of a Metaverse, where users can freely interact, socialize, and engage in a range of activities within a virtual environment.

To fully immerse myself in this virtual environment, I attended a series of church meetings, where I socialized with pastors and other attendees. Additionally, I became a member of a virtual dance academy and actively participated in dance classes. My dedication extended to a 6-week-long dance project, which culminated in a group performance. Throughout this experience, I discovered a vibrant network of social media platforms and online communities beyond VRChat. For example, many VRChat users also stayed connected on Discord. I then began recruiting users for interviews, spending over 38 hours interviewing users. Each interviewee chose a world in which I would conduct the interview. These worlds either held significance to the interviewees or were simply locales that they found peaceful and comfortable. For example, *spetemaster 195d* chose ***Udon Bird Sanctuary*** because his real-world occupation is related to managing birds at a zoo, and he feels comfortable staying in that virtual world and feeding ducks in the virtual space (which that world allows as an entertaining function). *Pastor_Mike* chose the ***MetaChurch*** world, which is his own church world, to express his identity as a pastor in the metaverse. He had lists of some other worlds that he liked being at and asked if I

wanted to meet somewhere else, but he told me that the MetaChurch is where is identifies himself the most, so we decided to stay there for the interview. I also collected YouTube videos, websites, and other digital sources that added to my understanding of the phenomenon.

Table 3. Description of interviewees.

Gamer Tag	Duration	World Selected for Interview
AlienMan ab12†	95 mins	Amber Glade
CustomKnight†	50 mins	Night Church
F.d.L†	36 mins	Night Church
CH3SH1R3	98 mins	Soft Solace
spetemaster 195d	65 mins	Udon Bird Sanctuary
Pikapetey	113 mins	The room of the rain
DJ Soto (Pastor DJ Soto)	36 mins	VR Church Park
DJ Soto	15 mins	VR MMO Church
pintsizedrobot (Pastor Koko)	85 mins	VRChurch
Pastor_Mike	89 mins	MetaChurch
Goose316 (Pastor Goose)	115 mins	Private office world and new beta Cornerstone VR Church
PastorGoose (Pastor Goose)	53 mins	New Cornerstone Church World in VRChat
blues4th	85 mins	Outer Space Obelisk v1.26
Xavierkiller22	127 mins	Cornerstone VR Church
Moondoodle	71 mins	Nordic Lakehouse Home
Shnarff	264 mins	VR Dance Academy
StoneAngel	75 mins	Treehouse
JustAnotherFoxGirl cb4e	96 mins	Treehouse
AlinaD (Pastor Alina)	173 mins	VR MMO Church board room
Lyuma	119 mins	MineCraft
PastorJayPo	84 mins	New Cornerstone Church World in VRChat
Chedders C	148 mins	A copy of Pastor Alina's AltspaceVR church world that he co-designed
Jesuslovesu (7idi)	52 mins	Sakura Sunset
Meta Angel	79 mins	Sunset Apartment
PhantomMethos	63 mins	Astral Bounds

[†]Pseudonym

Table 3 lists all interviewees and where they chose to meet with me for the interview.

2.3. Findings

In the sections below, I first discuss the three layers of self-presentation affordances – platform, VR, and world. Next, I discuss users' experiences of liminality at the intersection of the three affordances. Finally, I discuss user self-presentation strategies to preclude and manage such liminal experiences.

2.3.1. Platform Affordances in VRChat

The VRChat platform offers four affordances for self-presentation – gamer tags, avatars, group tags, and trust levels.

2.3.1.1. Gamer Tag

The ***gamer tag*** refers to the username assumed by a participant. Many gamers choose gamer tags that hold personal significance and have an interesting backstory. For example, now *PastorGoose* – who then used the gamer tag *Goose316* – took his gamer tag from his high-school baseball team-mates' nickname for him and from a bible verse.

> *I've just been Goose since I was a freshman in high school. I played baseball and the seniors on the team were handing out nicknames I got Goose and I've been Goose ever since and it just kind of followed me my whole life… And then it made sense that that would be my Metaverse name. The 316… Goose is usually taken before I get there. So 316 [is] from John 316 – it seemed like a good number to use. If you're a Christian and*

you see 316… I think probably… that like stands out a little bit … And that's … why I chose it.

PhantomMethos described his choice of his gamer tag, while pointing at his gamer tag floating above his head, thus:

The last part of my name, Methos up there, was actually taken from a nineties TV show the Highlander…. Methos was a character in that. I used that for gaming for a long time. At some point I ran into a problem where the name was taken, so I just shoved Phantom in it, like Shadow of Methos… And then since I got VR, … I've just tried to be consistent [across platforms]… The show [Highlander] is based on … immortal people who are, who fight, fight with swords, until there's only one of them in the end. Methos was one of the oldest of the immortals, if not the oldest, in the show, and he was very … pragmatic. He would avoid fights where he could or do the logical thing instead of, you know, playing the hero. You know, if things were going down, he'd back out the door if the opportunity struck in. But he'd do what needs to be done when it when it needs to be done. [So, it was a pragmatic character]… That's probably roughly accurate to my personality.

Thus, these names allow users to express their creativity and craft an identity that aligns with their persona within the game. Most gamers prefer a consistent username to maintain their online presence and reputation. However, some change their gamer tags to reflect their evolving persona. For example, *Jesuslovesyou* initially used her real name in leet speak-type spelling[4] as 7idi to make friends in the metaverse. When she started attending VR churches and spending time evangelizing others, she decided to change her name to *Jesuslovesu*. As an additional example, *PastorGoose* initially began playing VR games using the gamer tag *Goose316,* which held personal significance to him as a Christian. However, he later decided to change his name to *PastorGoose* to align with his role as a

[4] Leetspeak refers to a type of cryptography that involves mixing alphabets with numbers and symbols that resemble alphabets. It has been used since the early 2000's. Examples from the interviewees include CH3SH1R3 (CHESHIRE) and 7idi (Lidi).

pastor within his metaverse church. The gamer tag is one way in which participants perform their virtual selves and contributes to their overall gaming experience and to their interactions with the community.

2.3.1.2. Avatar

People hold different roles in the Metaverse. The dramaturgical nature of communication via avatars makes people immersed in the interaction and social establishments in the community they involve themselves into (Goffman 1959). The mentioning of *wearing* the avatars resembles the mask put on people's faces to act in a play.

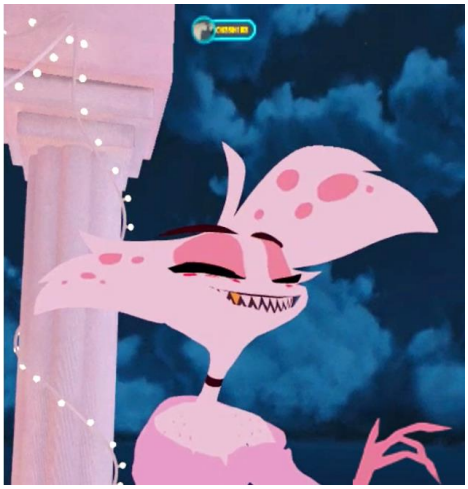
Avatars are the second affordance for self-presentation in VRChat. Most avatar choices leaned toward presenting an idealized self. For example, *CH3SH1R3* said:

> *I have a few types. All of them are pretty androgynous or female. I really like this type of pink. The sakura magenta cherry blossom color combination. I really like that. I like these simple, but I like fairly distinct designs. I'm not like… if they have 50 chains and a thousand guns and a coffin on their back and everything else. It's like, that's cool, but… I like just, well designed… simple, pink purple magenta with cherry blossom colors… in like gender to a degree. Androgynous or female. And it's visual design. [For many other avatars that I have,] all of them are like gray, black and white. And some of them are just, like, very nostalgic… I have an avatar, Vector Man, which is like really obscure, like Sega game like 1995…It's stunning. But it's not my identity.. But yeah… the color [pink], that shade of pink was like… about new beginnings… it just became like strangely meaningful to me… It's also a color of flamingos… It makes me feel "me".*

Notably, *CH3SH1R3's* avatar is a furry, signaling his membership in that subculture. *CH3SH1R3*'s gamer tag adds a consistent signal, reminding others of the Cheshire Cat

character from the novel “Alice in Wonderland”. Figure 2 depicts his avatar, highlighting the cherry blossom color he chose[5].

Figure 2. CH3SH1R3’s pink furry avatar



Similarly, Pastor Koko refers to her diminutive stature in her gamer tag, *pintsizedrobot*, which is consistently represented in her avatar, which is cute and petite. Nonetheless, she said:

> *I would prefer non-human [avatars] and find cute [ones] … anime would be fine… I want it to be something that expresses me. I like robots. [The avatar] needs to express me… If [the avatar] looks like me, like I do in the real world, that’s boring. Because you [can] just look at a picture of me or look at me in a real world… something that expresses my inner personality matters to me more than my physical appearance.*

Figure 3 shows Pastor Koko’s (pintsizedrobot) medium-small height robot cat avatar with eyes that dynamically turn from yellow to red when she talks.

[5] I told them that she was using her standalone Quest, unlinked to a PC. Interviewees confirmed that avatars depicted were Quest-compatible, and that I was seeing correct images of their avatars.

Figure 3. Pastor Koko's (pintsizedrobot) avatar



Others view their avatars as an extension of their disembodied self. For example, *CustomKnight* said:

> *I feel like every avatar that I wear is an extension of the emotions that I'm currently feeling. And that is usually the way that I feel… You know, I'll wear this [main avatar] if I want to be good ol' CustomKnight that's you know, just partying and stuff. I wear my Glaceon Avatar (a cute Pokémon character that resembles a baby-blue colored fox) when I want to feel like I'm a little bit cutesy, or you know, I wear my Storm Trooper Protogen avatar you saw me in, when I, you know, I'm just chillin and if feel like, you know, being a, you know, a storm trooper, you know, it's just different emotions that I feel and I want to express it through my avatars.*

Professionals considered the suitability of their avatars to their roles. For example, Pastor *DJ Soto* said:

> *If I have a human-based avatar versus, you know, if I'm like Kermit the Frog or Darth Vader, just be a little bit, a little bit more silly. So, [using a human-based avatar,] it's more of an intentional way of just being more grounded and trying to communicate to those outside of the metaverse…*

And users often expressed possessiveness over their avatars, whether it was their primary go-to avatar or just one among their collection. For example, while showing me her avatar collection, *7idi* said:

No, no, no. I don't [let others clone my avatar]. I don't give [my avatar] to others. NO. I found it. It's mine. [6]

Across platforms, users can be mindful of the threats to self-presentation that accrue from changing their avatars. For example, *Chedders C* noted:

I went from Altspace into VRChat. So, when I see other people with these crazy avatars looking like a pirate and I'm like, 'I remember you from Altspace', and … I have a very interesting disconnect.

Users therefore pay attention to showing the intended self as much as possible. For example, one of the first interviewees that I met in the beginning of my VRChat metaverse platform journey, *AlienMan ab12*, did not hesitate to show me how to use the expressions an avatar could use in order to show facial expressions during a conversation in metaverse platforms. He explained step-by-step:

Clear. Just get out of the menu. Okay. And then hit the top button on your left joystick and it'll bring up a menu button in your right hand. There'll be a pointer. You see the pointer. It's like a little blue thing that comes out of your hand. Like, I'm waving it around right now from my side. You see it? … I think you're on the wrong one… So, like, shake it, [you will] see the circle, and then there's options, emojis, expressions. So when you get to that menu, don't click on anything else.

Shnarff, during the 4.5-hour-interview, made sure to let me know how much effort he put in to self-learn how to get the perfect shades, colors, facial expressions, and clothing style look natural on his avatar:

Think about Yeah. And I the, the key part one was like, well I did, I guess I should add these pants that also take forever to fit because usually like the models either made for really, really tall offers, you know? So they're just so much like he squish it down. It just doesn't work anymore. And I had to do a lot of weird things to make it work… I'm working on a cute little outfit for, like, the ballroom dancing group classes. Cause I

[6] There is a menu function in VRChat that you can click on to disallow others from cloning your avatar.

was going to. I did some, like, a duo classes with people in a ballroom with partners, and they all wear, like, formal stuff. And, like, the next year, I think your name is usually have, like, robotic avatars and automaton lined up like Victorian hair. Looking one for that, I'm like, Oh, it's so cool. Like, so I've been working on like a fancy suits. It's I resized everything black and white paint. We paint every layer of the clothing like the shirt, the vest, the coat, tie in the pants and stuff. So work on that. But also a lot of my my limited right now is just like, okay, I can resize the clothes to make them work.

This was not an exception for *Lyuma*, who had extensive knowledge on avatar designing,

I mean, I use the cloth and blender, and so it the way it flows probably makes it look kind of silky. And then I, I, I put a shader on it that's very sparkly. I made the shader as well. It's a bit silly. I made it for it. I made it for a different purpose, actually. And it just looks glittery. And so I've been using it as a colleague glitter shader down here. And it's funny, sometimes you make something and then it comes up with a different use. It's like, I guess how a lot of a lot of science happens that way. You like scientists, like I'm trying to make this and then I actually got that instead. But it's actually really good about other things…

Lyuma continues to share with me a perfectionist side of his, and lets me know the time when he felt good enough to share the shader, or the surface design of avatar models (typically for clothing texture details). Not only does he consider his appearance to be important, but he also goes as far as sharing the shader with others to ensure it is perfectly marketable and of a certain level of quality. Whether or not the shader actually has his name imprinted as a form of copyright is not the crucial factor. The important aspect is that other users are aware that *Lyuma* shares the shader with others, and this knowledge holds significance:

And this is the reason I actually worked out a little bit of that world and say one point missed Abby was going to I think it was missed. Abby asked me for the shader files for it and so I like got the shader file. I'm like, Oh, I heard that. And I thought, This is my avatar. And I put on Avatar and there was a bug and I fix the bug. And then I'm like, Oh, this looks pretty cool. And the avatar, it looks like glitter and I better have fun. So I say this is I don't, I don't really do a lot of random things and I've been playing with shaders for a while, but oftentimes, like I'm not so proud of something that I want to

distribute it or it works one time. This is one of the things where I felt I was proud enough to distribute it.

Meta Angel lamented the lack of variety in avatar designs, noting that not all metaverse platforms offer a wide selection of braids, twists, or dreadlock-style hairdos. As a result, she settled for an avatar that resembled her real-life hairstyle the most. However, she expressed dissatisfaction with the available style:

I have twist, but I take braids like you see if you see my video, you see how I look. They don't have my hairstyle. They have, like, locks. Locks are very distinct from braids and tourism. You could tell like, they're locked. You can't unlock them. There's one. Twists you can take. Like, it's a huge difference in how they look, but they do not have my hairstyle. So I do kind of feel sometimes slighted, like, why can't I ever find my hairstyle? So it's like this because I had no choice. I've never worn my hair like this in real life. I've never this is not how my hair looks at all. But I had no choice. But I do feel like this represents me as close as I could possibly do with this particular character. With with using ready player knee. It's not that it's a this is by design because they have other hairstyles that have like a more ethnic features and stuff. They just didn't include it. Oh, it just didn't come up as priority, huh? I mean, it's not hard at all to make the hairstyle that I wear. You can make it as one big blob and have just little you know what I'm saying?

Meta Angel then proceeded to share her story of the difficulties she encountered in finding a suitable place to have her hair done, which ultimately led her to learn to style it herself.

I had to learn how to do my own hair because of the lack of places near me that could do it. So it takes at least a weekend to do it, But I do it. I've been doing my hair for about five years now. I've been doing my now. It takes a lot of work, so she has to have some skill to be doing all the different things. She does way better than me. I haven't seen her hair, but I can already tell. I'm just I do. One style doesn't wear my hair one way for like five years. So. I think everybody everybody is. It's it's more because I'm in corporate America and my natural hair texture is not really professional, so I have to kind of assimilate. So I do it because I have to do it. I mean, I couldn't just wash my hair and dry it and walk out the door like I couldn't do that. I had to spend an entire weekend putting it in there and all that, because otherwise I don't think that would be perceived...

The conversation naturally shifted towards this topic, drawing a parallel comparison to how many metaverse platforms lack the necessary variety for her to fully express herself according to her preferences.

> *Yeah. So even in VR there's and I want to talk about that with avatars like I experienced in our space, like, Mm. You, when you come in like some people present themselves different, a different complexion, a different, just a different appearance, Maybe it's an option. What is it call. I had it earlier, the alter ego. Or maybe it's what they wish they look like. Or maybe it's what they really look like. And I want to kind of going behind all the different reasons people present themselves the way that they do. But like you had a be intentional and VR, if you really want to be presented way you might not want to be, you might have feelings about how you present yourself in real life. So you come in here and you might want to present yourself a little bit differently so that you receive. Yeah. Then this is the this is what I picked but it's it's not there. But I mean it's just at the end of day, like I'm so used to having this whole thing about my hair anyway…*

Sometimes, users intentionally choose not to view the avatar another person is using to express themselves. I have observed instances where individuals click on the "eyeball" icon to reveal the other person's avatar, but then promptly click on it again to hide it, opting to see a simpler fallback avatar according to their personal preference. Figure 4 shows how different others' avatars are before and after clicking on the eyeball icon to reveal the intended avatars instead of seeing the fallback avatars.

Figure 4. Comparison between before and after clicking on the eyeball menu icon to reveal the real appearance of users' avatars



A. Two conversants' fallback avatars shown before clicking the eyeball menu icon	B. Two conversants' intended avatars revealed after clicking the eyeball menu icon

2.3.1.3. Group Tag

The third platform affordance for self-presentation is the group tag. Users have the option to display tags for the groups they belong to, alongside their gamer tags. When it comes to public groups, users can choose whether these group tags are always visible, visible only to friends, or hidden. Given that social identities are forged at the nexus of one's social groups (Hogg and Terry 2000), displaying one's groups indicates their importance to the user, thereby inviting inferences about their self-identity. For example, *Shnarff* noted,

> *… when you're working out in a [VRChat] group like a workout class, you just have this extra social pressure… And you know what? It might even be harder in VRChat too, because they see your name. They can see your profile [including which groups you are a member of].*

Group signals in one's self-presentation can also carry risks and potential drawbacks. For instance, individuals who are not interested in role-playing may consciously avoid interacting with users who have a "Loli Police Station" group tag, as it explicitly signifies their involvement in role-playing activities. In a similar context, during the interview, *Xavierkiller22* expressed his dissatisfaction energetically by waving his arms and pointing at his gamer tag floating above his head, and said:

> *People try to add me to stuff like ERP [Erotic Role Play groups], I can't do it… Well, [eventually] I joined all the groups, but I basically don't talk to any of the people… it was like…. I just needed to fill out my resume. So, people… invite [me] to dinner…*

Hence, *Xavierkiller22* serves as an example, illustrating the social value associated with participating in and disclosing one's group affiliations.

2.3.1.4. Trust Level

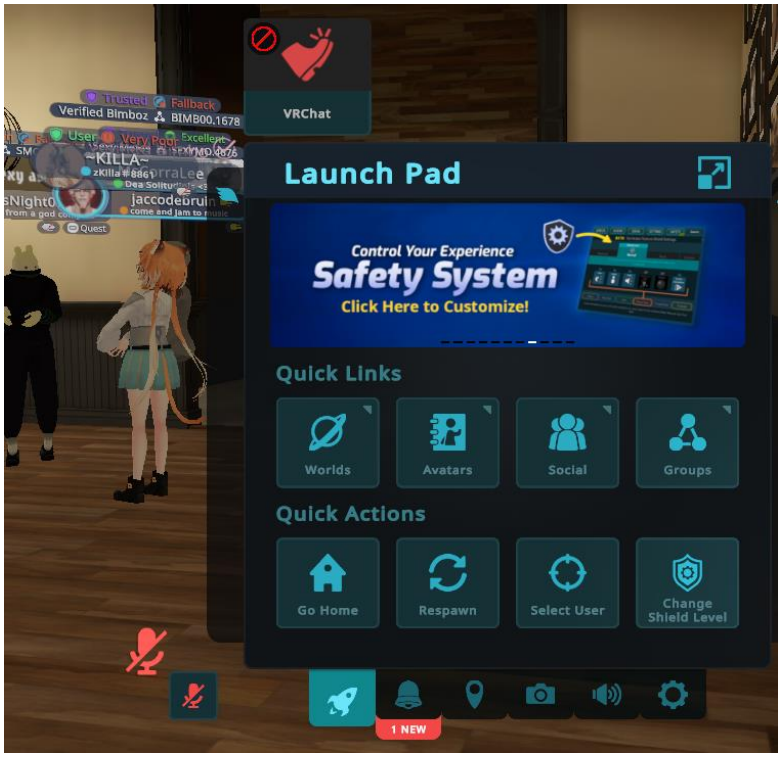
The fourth self-presentation platform affordance in VRChat is the user's trust level. These include Visitor, New User, User, Known User, and Trusted User. Trust level is an indicator of user expertise and socialization.

A Trusted User is aware of the technical difficulty experienced by others with lower-fidelity VR resources and knows how to moderate their own self-presentations – for example, their avatars – accordingly. If necessary, they will even change into a different avatar to accommodate a less experienced and technologically limited user. Trust levels encourage users to make themselves more tech-savvy. They also encourage users to develop resources for others as one requirement for becoming a Trusted User is to create and launch at least

one VRChat world that includes custom content[7]. To earn the Trusted User rank, users must also demonstrate their ability to socialize and interact adeptly with others in the game. The Trusted User rank is automatically given through the VRChat system once certain requirements had been met, such as having a good balance between adequate game-play hours (1000+ hours), having added multiple friends into your friends list, and having built at least one user-generated world in VRChat. If a user is repeatedly *voted to be kicked out* (being forcefully removed from a world instance) or *blocked* (being disabled to be shown and be heard by other users of a world) by other users, it delays their progress toward achieving the Trusted User status. This highlights the importance of maintaining positive social interactions and building a good reputation within the VRChat community. Figure 5 illustrates the appearance of receiving a vote suggestion to remove an individual from a world due to their disruptive behavior, causing inconvenience to others.

[7] Source: https://www.pcguide.com/vr/faq/how-to-become-a-trusted-user-in-vrchat/

Figure 5. Receiving a kick-out vote suggestion for a user who was annoying others



This social skill in the metaverse, an (avatar-) face-to-face interaction, requires the "adjustment" based on self-convincing and indeed of the tactful support of the intimate circle formed around the activities in the Metaverse (Goffman 1967). The better you are at maintaining your face in the Metaverse, the more friends you get to earn and eventually upgrade yourself to gain the "trusted user" rank, paving your way through all the way from the bottom of the totem pole of a "New User". Some people often create a simple world in order to upgrade their ranks and gain the "trusted rank" from the VRChat system, signaling that they are safe and trustworthy users, good enough to be friends with and still not feel any harm while engaging in the game play. Figure 6 shows the trust levels and how they are made visible to users.

Figure 6. Depiction of trust levels in VRChat



2.3.2. VR Affordances

As noted earlier, the VR gear that a user brings to the VRChat platform affords her self-presentation. Two key VR affordances are for data processing and body tracking.

2.3.2.1. Data Processing

Four technology features afford metaverse users' data processing – gaming PC[8]s, graphics cards, RAM, and internet speed. The user's experience in VRChat and other metaverse platforms is heavily influenced by the technology they possess. Specifically, there are four technological factors that afford opportunities for self-presentation: gaming PC, having a capable graphics card, possessing sufficient random access memory (RAM) to ensure smooth processing speed, and maintaining a high-speed internet connection. These elements collectively shape and enhance the user's engagement and self-expression within the metaverse environment.

[8] Personal Computers such as desktops and laptops.

2.3.2.1.1. Gaming PC

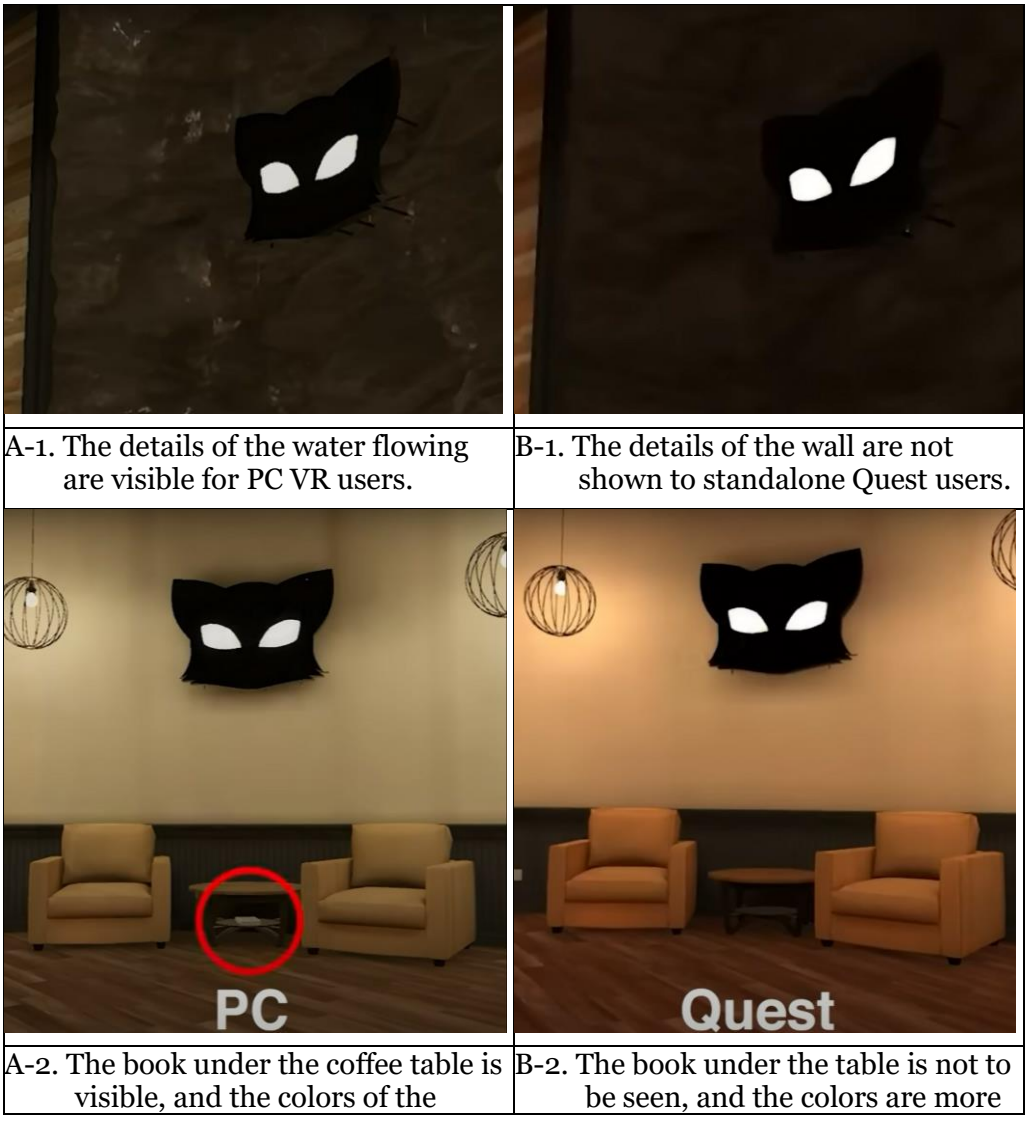
The availability of a gaming PC is the primary technological factor that influences self-presentation in VRChat. A gaming PC, typically running on the Windows operating system, is a specialized personal computer designed to handle demanding games that require higher-end graphics cards, powerful processors, and increased memory capacity compared to standard computers. The introduction of standalone VR devices like the Quest has made it more affordable for individuals to access various metaverse platforms. However, the VR and metaverse experiences can significantly differ depending on whether one is using a standalone Quest or a PC VR system.

The Quest 2, for example, incorporates the NVIDIA GeForce GTX 1660 Ti as its embedded graphics card. However, there are certain compatibility limitations that need to be addressed to ensure full access to the metaverse experiences available to PC VR users. Additionally, users of Apple's Mac products face obstacles in enjoying optimal metaverse platform experiences since gameplay support is not available on Apple devices. Consequently, owning an Apple product can hinder access to metaverse platforms.

Moreover, even with a capable graphics card supporting gameplay, most games are primarily developed for PC compatibility. This means that unless a special patch is provided for Apple's iOS, most games can only be run on PCs. The Oculus application installed on a PC indicates whether the computer meets the requirements for running VRChat.

In Figure 7, a comparison is shown between what standalone Quest users and PC VR users observe in the VRChat world called "Black Cat". This depiction highlights the differences in world affordances between the two platforms, as shared by a popular VR YouTuber named Twice, who has a following of 58.9K subscribers[9].

Figure 7. Comparison of what PC VR users and Standalone Quest users see differently in the Quest (and PC) compatible VRChat world "Black Cat"



A-1. The details of the water flowing are visible for PC VR users.	B-1. The details of the wall are not shown to standalone Quest users.
A-2. The book under the coffee table is visible, and the colors of the	B-2. The book under the table is not to be seen, and the colors are more

[9] Source: https://www.youtube.com/watch?v=aVhP3_c7ckE

shaders are more delicate and neutral for PC VR users.	raw and lacking depth for standalone Quest users.
	
A-3. On the second floor of the Black Cat, there is a window with wooden beams, through which users can see a night city landscape beyond, only visible to PC VR users.	B-3. Standalone Quest users just see the darkness behind the windows.
	
A-4. PC VR user's Black Cat logo and screen looks detailed and sharp.	B-4. The same logo in the same part of the world looks hazy, lacking details for standalone Quest users.

According to the accounts shared by the YouTuber Twice, there is a sense of disappointment when it comes to how others perceive his avatar in VRChat. Despite owning numerous avatars with impressive graphics and intricate details, there seems to be a discrepancy in what users on the Quest platform see compared to what he intends to portray. In Figure 8, a visual comparison illustrates the disparity. For Quest users, their

experience of Twice's avatar is limited to a fallback representation, where a clown-like character is depicted wearing amusing and vibrant attire. This fallback avatar typically lacks the same level of graphical quality and intricate details that are present in the avatars he owns. As a result, the visual representation of his avatar on the Quest platform may not fully capture the intended design and aesthetic he desires to convey. Although users have control over which fallback avatar they will show others, it is not the intended primary avatar that the user would have originally wanted to show. This discrepancy in avatar perception further highlights the differences in graphical capabilities and limitations between the Quest platform and more powerful PC VR setups. While Twice's avatars may exhibit impressive graphics and details when viewed by PC VR users, the reduced graphical fidelity of the fallback avatar on the Quest platform can lead to a less immersive and visually captivating experience for Quest users. It is worth noting that these observations and disappointments are specific to the individual experience of Twice and may not be representative of all users or avatars within VRChat.

Figure 8. How people see a user's avatar differently whether they are PC VR users or standalone Quest users.



A. PC VR user sees *primary* cute girl avatar wearing a crown and holding a fancy sword that sparkles

B. Quest User sees a *fallback* avatar of a clown wearing colorful clothes.

Using a gaming PC typically ensures that the user has a graphics card, processor, and memory capable of supporting VR applications. However, it is important to note that even within the gaming PC category, there can be variations in performance capabilities based on the specific hardware components. The performance of VRChat and other metaverse experiences can still vary depending on the quality and specifications of the gaming PC.

2.3.2.1.2. Graphics Card

Hence, the second important technological factor that affects self-presentation in VRChat is the user's graphics card specification – that is, under the condition that someone already possesses a gaming PC. A gaming PC with a higher-end graphics card provides a smoother and more visually immersive experience in VRChat. It can handle more complex scenes, larger numbers of users in a single world instance, and higher graphical settings, resulting in improved self-presentation and overall enjoyment of the metaverse. On the other hand, a gaming PC with lower-end or outdated components may struggle to deliver optimal performance and visual quality, leading to potential limitations in the metaverse experience. Users may encounter issues such as lower frame rates, reduced graphical fidelity, or difficulties handling resource-intensive interactions within the virtual environment.

As shown in Table 4, VRChat provides information regarding the minimum graphics card requirements necessary to play the game in PC mode. Among these, the most notable differentiating feature was the graphics card. High-end gaming PCs often incorporate advanced graphics cards that offer enhanced graphical capabilities. These powerful graphics cards contribute to creating immersive and visually appealing virtual environments in VRChat. They enable users to experience higher visual fidelity, smoother frame rates, and more detailed graphics, all of which enhance the overall self-presentation within the metaverse. By having a robust graphics card, users can showcase their avatars and interact with the virtual world in VRChat with improved visual quality. This technological affordance allows for a more captivating and visually engaging self-

presentation, enabling users to fully appreciate the graphical details and nuances of the virtual environment. It is important to note that having a graphics card that meets or exceeds the minimum requirements ensures optimal performance and visual quality in VRChat and other PC-based VR experiences. Users with lower-spec graphics cards may experience limitations in graphical fidelity and may not fully realize the visual potential of self-presentation in the metaverse.

Table 4. System Requirements announcement by VRChat Help Desk[10]

	Minimum Requirements	Recommended Requirements (as of October 2022)
OS	Windows 8.1, Windows 10	Windows 10
Processor	Intel® i5-4590 / AMD FX 8350 equivalent or greater	Intel® i5-6500 / AMD Ryzen 5 1600 equivalent or greater
Memory	4 GB RAM	8 GB RAM
Graphics	NVIDIA GeForce® GTX 970 / AMD Radeon™ R9 290 equivalent or greater	NVIDIA GeForce® GTX 1060 / AMD Radeon™ RX 580 equivalent or greater
DirectX	Version 11	
Network	Broadband Internet Connection (25+ megabit preferred)	
Storage	21.5GB (~1.5GB for application, remaining for content cache)	

It is important to acknowledge the financial implications and disparities in graphics card capabilities, as they contribute to unequal access and experiences within the metaverse. These disparities can shape perceptions of economic social class and impact the opportunities for self-presentation and participation in the virtual realm. In response to the YouTube video, user @ariellebinette7706 left a comment expressing appreciation for

[10] Source: https://help.vrchat.com/hc/en-us/articles/1500002378722-System-Requirements

the segment, specifically highlighting its value for individuals who do not possess a gaming-capable computer:

> *I love this segment to help people who don't have a gaming capable computer. Wish there were more tips and tricks for us on the lower end of the totem pole.*

This comment reflects the sentiment of individuals who may not have access to high-end gaming PCs or advanced graphics cards, but still have an interest in participating in the metaverse and virtual reality experiences. It underscores the importance of providing inclusive content and guidance that caters to users with limited resources or lower-end technology. By offering more tips and tricks specifically designed for individuals in such circumstances, the metaverse community can promote accessibility and equal opportunities for participation and self-presentation.

In another video by Paradise Decay[11], a YouTuber with 21K subscribers, the VRChat gameplay using a GTX 1060 graphics card (which meets the minimum requirement) was featured. The video showcased that the gameplay experience was characterized by clunkiness and choppiness, particularly when more than five people were present in the room. Additionally, the graphics appeared blurry and low-quality, lacking the level of detail typically seen in shaders and the fancy aesthetic details of avatars' skin and clothing surfaces. This observation highlights the limitations of using a graphics card at the minimum requirement level, such as the GTX 1060, in VRChat. While it may allow for basic functionality and entry into the virtual world, it struggles to deliver a smooth and

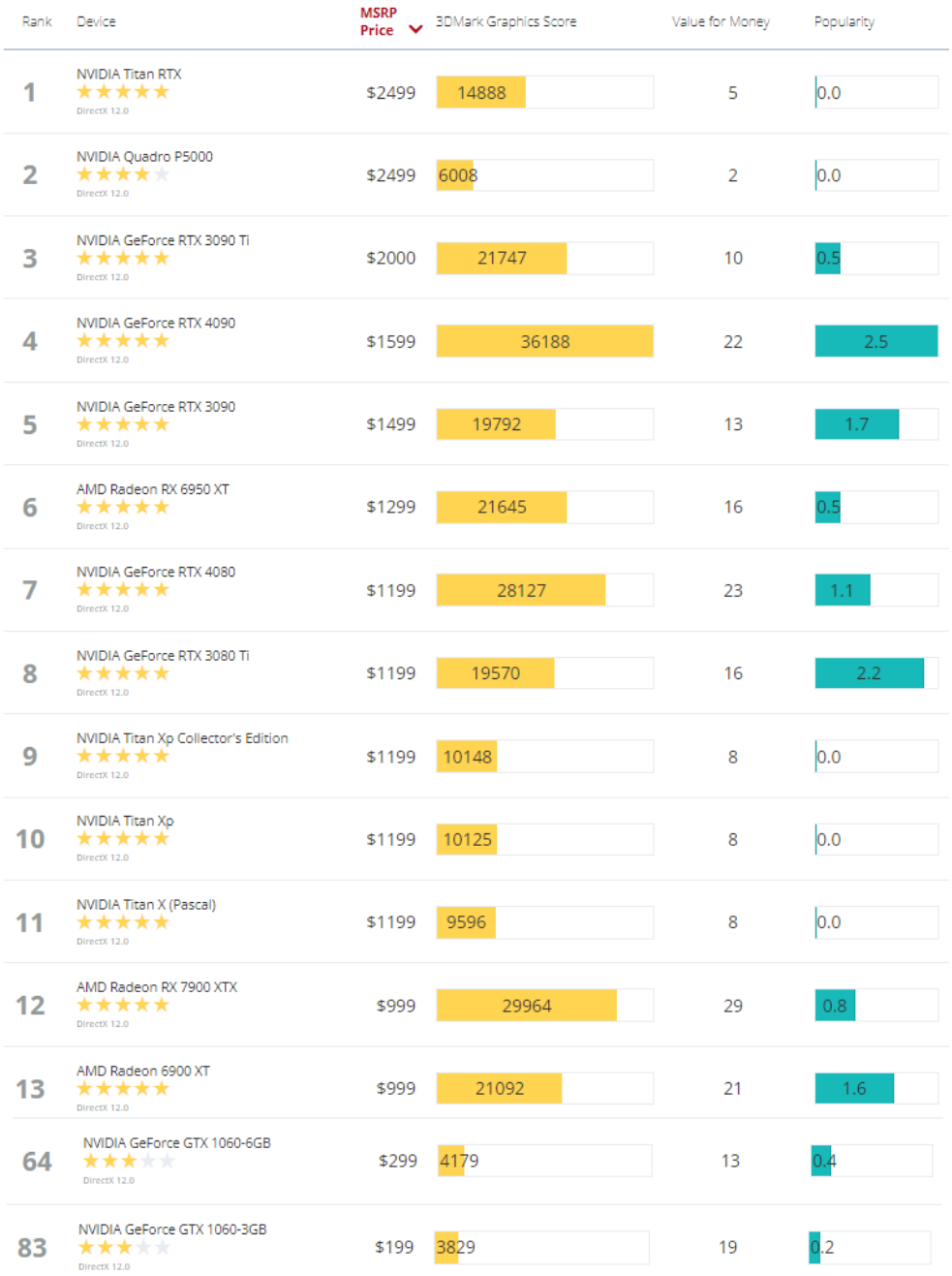
[11] Source: https://www.youtube.com/watch?v=qHrYnImF-60

visually appealing experience when confronted with more demanding scenes and graphics-intensive elements. The performance issues mentioned, including the choppiness and lack of detailed graphics, can hinder the immersive and engaging nature of the metaverse experience. The video serves as an example of the challenges faced by users with lower-end graphics cards when attempting to fully enjoy the graphical richness and intricacies of VRChat and other similar virtual reality environments. It underscores the importance of considering hardware capabilities and their impact on self-presentation, as well as the overall user experience within the metaverse.

Figure 9 displays the benchmark results of graphics cards which can be used for gaming. When considering graphics cards, factors like price, effectiveness, and popularity play important roles. The price range, starting from $199 and going up to $2,499, represents different tiers of graphics cards with varying performance capabilities. Lower-priced graphics cards, such as those around $199, may offer basic performance suitable for casual gaming or less demanding tasks. As the price increases, the effectiveness and performance of the graphics cards tend to improve. Graphics cards in the mid-range price bracket, around $1,599, often strike a balance between cost and performance, making them popular choices among users. On the higher end of the price spectrum, graphics cards priced at $2,499 are generally considered top-of-the-line and offer cutting-edge performance. However, these high-end models may be more expensive and may not provide a significant cost-to-performance advantage for the average user. It's important to note that the specific price points, effectiveness, and popularity of graphics cards may not always translate to making a choice to purchase. Also, it is noteworthy that despite the quality of the graphics card, people may choose to go with a relatively lower tier graphics card and sacrifice their

gaming experience when the price point is too high for marginal improvement of the quality, hence, the cost effectiveness.

Figure 9. Best Graphics Cards Benchmarks[12] as of June 2023



Rank	Device	MSRP Price	3DMark Graphics Score	Value for Money	Popularity
1	NVIDIA Titan RTX ★★★★★ DirectX 12.0	$2499	14888	5	0.0
2	NVIDIA Quadro P5000 ★★★★☆ DirectX 12.0	$2499	6008	2	0.0
3	NVIDIA GeForce RTX 3090 Ti ★★★★★ DirectX 12.0	$2000	21747	10	0.5
4	NVIDIA GeForce RTX 4090 ★★★★★ DirectX 12.0	$1599	36188	22	2.5
5	NVIDIA GeForce RTX 3090 ★★★★★ DirectX 12.0	$1499	19792	13	1.7
6	AMD Radeon RX 6950 XT ★★★★★ DirectX 12.0	$1299	21645	16	0.5
7	NVIDIA GeForce RTX 4080 ★★★★★ DirectX 12.0	$1199	28127	23	1.1
8	NVIDIA GeForce RTX 3080 Ti ★★★★★ DirectX 12.0	$1199	19570	16	2.2
9	NVIDIA Titan Xp Collector's Edition ★★★★★ DirectX 12.0	$1199	10148	8	0.0
10	NVIDIA Titan Xp ★★★★★ DirectX 12.0	$1199	10125	8	0.0
11	NVIDIA Titan X (Pascal) ★★★★★ DirectX 12.0	$1199	9596	8	0.0
12	AMD Radeon RX 7900 XTX ★★★★★ DirectX 12.0	$999	29964	29	0.8
13	AMD Radeon 6900 XT ★★★★★ DirectX 12.0	$999	21092	21	1.6
64	NVIDIA GeForce GTX 1060-6GB ★★★☆☆ DirectX 12.0	$299	4179	13	0.4
83	NVIDIA GeForce GTX 1060-3GB ★★★☆☆ DirectX 12.0	$199	3829	19	0.2

[12] Source: https://benchmarks.ul.com/compare/best-gpus?amount=0&sortBy=PRICE&reverseOrder=true&types=MOBILE,DESKTOP&minRating=0

However, having a good graphics card may not always be the ultimate solution. VRChat, along with numerous other VR games, was primarily developed for PC platforms. As a result, there is indeed an entry barrier for Apple's Mac iOS users, irrespective of the quality of the Mac's built-in graphics card. The compatibility issue stems from the fact that VRChat and similar VR experiences were not specifically optimized or designed to run on Apple's Mac operating system. While Mac computers may possess decent graphics card capabilities, the software support and infrastructure required to run VRChat on Mac are limited or non-existent. Consequently, Mac users encounter limitations when attempting to access the full range of metaverse platforms and experiences. The inability to run VRChat on Apple's Mac iOS prevents Mac users from fully engaging in the metaverse and participating in self-presentation within VR environments. It's worth noting that this barrier applies specifically to Apple's Mac iOS users and not to all PC platforms. PC users, particularly those with Windows-based systems, generally have better compatibility and access to the range of VR games and metaverse platforms due to the broader support and optimization available for the Windows operating system. In summary, the entry barrier for Mac iOS users in VRChat and other VR games stems from the lack of compatibility and optimization for the Mac platform, regardless of the graphics card capabilities of the Mac computer.

2.3.2.1.3. RAM

RAM indeed plays a significant role in the VR experience and having an adequate amount of RAM is crucial for smooth and immersive gameplay. It is generally recommended to have at least 8 GB of RAM to ensure a satisfactory performance in VR games and metaverse platforms like VRChat. Insufficient RAM can lead to performance issues and hinder the overall gaming experience. When the available RAM is limited, the system may struggle to efficiently handle the processing requirements of VR applications, resulting in choppiness,

lag, and reduced graphical fidelity. This can disrupt the immersion and make it challenging to fully enjoy the metaverse platform. By having a sufficient amount of RAM, the system can effectively manage the data and resources required for the VR experience. This enables smoother rendering, faster loading times, and improved responsiveness in the virtual environment. It allows for more seamless interactions with other users, smooth movement within the metaverse, and the ability to appreciate the visual details and intricacies of the virtual world. While 8 GB of RAM is a recommended minimum, it's worth noting that having higher amounts of RAM, such as 16 GB or even 32 GB, can further enhance the performance and allow for more demanding VR experiences with higher graphical settings and resource-intensive applications. Therefore, ensuring that your system has at least 8 GB of RAM is a basic suggestion for a smooth and immersive VR gaming experience. Having an adequate amount of RAM enables better performance, reducing choppiness and enhancing the overall metaverse platform experience.

2.3.2.1.4. Internet Speed

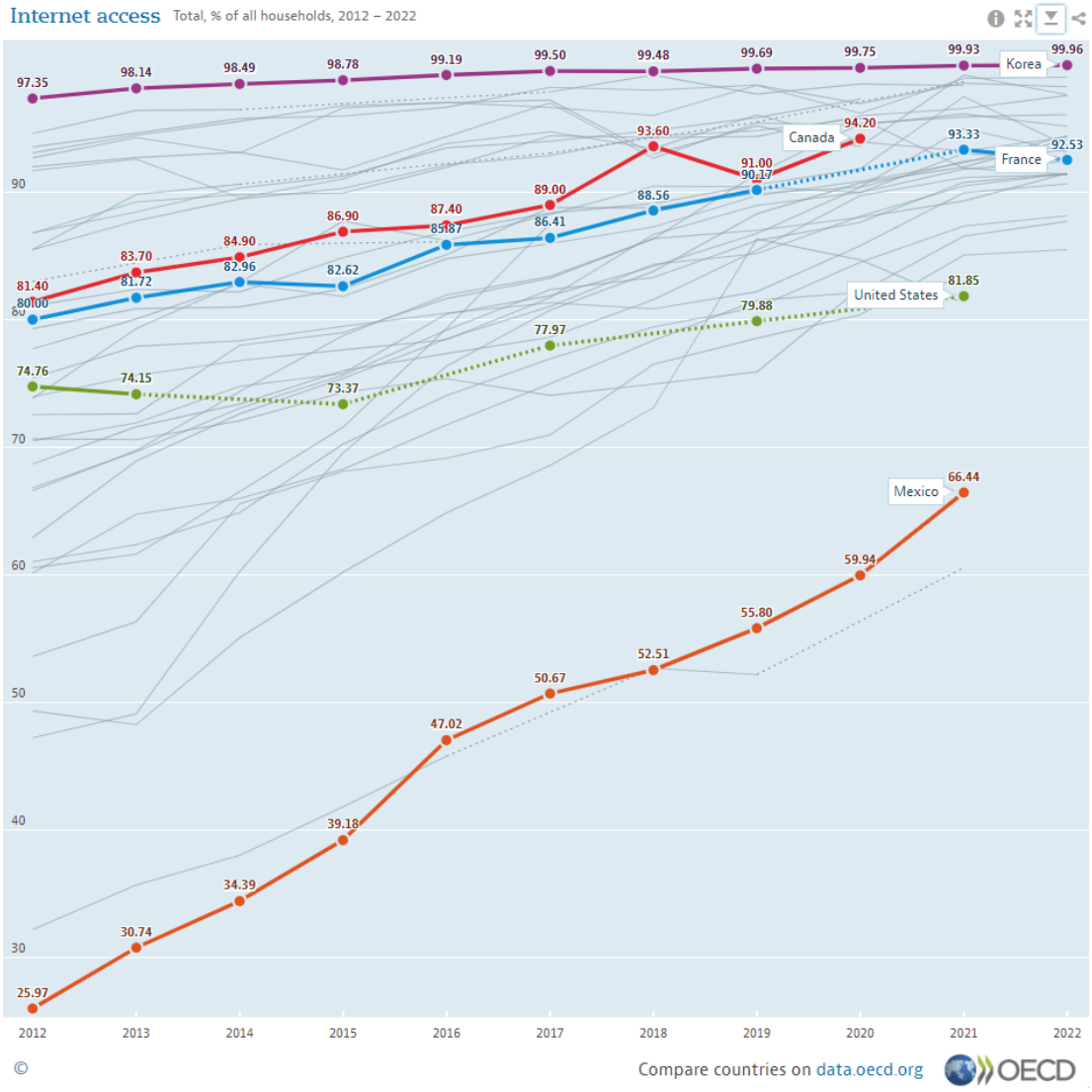
Internet speed is indeed a crucial factor that can impact the quality of the metaverse experience. Indeed, despite the desire for a 5G experience, the availability of 5G connectivity can be limited and not accessible to everyone. While 5G technology is being gradually rolled out by telecommunication providers, the infrastructure required to support widespread coverage is still being developed and expanded. While advancements in technology have introduced 5G internet as a promising solution, its availability and affordability remain limited, particularly in certain regions such as the United States.

Figure 10 illustrates the percentage of home internet access in the US compared to other OECD countries. This data suggests that individuals in countries with better internet coverage are more likely to have a superior metaverse experience. This is due to the potential for faster and more stable internet connections. However, it is important to consider that even if 5G internet is widely available, the associated cost of acquiring this service can be significantly higher than other options. Consequently, this cost may act as a barrier for individuals who cannot afford premium connectivity. Even if a person lives in a developed country, there could be differences by state or city, especially in the US, where there are disparities in technology among states or regions. Although a person may be wealthy enough to purchase fast internet services, the region may not offer high-speed internet access.

Having access to a reliable and high-speed internet connection is crucial for a seamless and immersive metaverse experience. It allows for faster data transmission, reduced latency, and smoother interactions within the virtual environment. Additionally, it facilitates the use of bandwidth-intensive features and services, such as real-time communication, multiplayer interactions, and content streaming, which contribute to a more enriched metaverse experience.

Therefore, while 5G internet holds promise in delivering improved connectivity and enhancing the metaverse experience, its limited availability and higher costs can still serve as obstacles for individuals to fully enjoy the benefits of a high-speed internet connection within the metaverse context.

Figure 10. Annual Home Internet Access of OECD Countries[13] during 2012-2022 (% of all households)



These components – gaming PC, graphics cards, RAM, and internet speed – create a ***digital divide***. Only those with extensive financial resources can afford the components that afford heightened self-presentation and experiences of self-presentation. Those

[13] OECD (2023), Internet access (indicator). doi: 10.1787/69c2b997-en (Accessed on 28 June 2023) Source: https://data.oecd.org/chart/782a

lacking such resources have limited affordances for self-presentation and are unlikely to have a high-fidelity experience of others' self-presentations.

2.3.2.2. Body Tracking

The body tracking affordance ranges from the original 3-point tracking (headset+two hands) to 9-point tracking to 11-point tracking. Of course, a user's access to this affordance is a function of their financial resources (their ability to afford it), but also their commitment to expressing themselves comprehensively in the metaverse and sometimes in a fashion better aligned with their enactment. For example, *Shnarff* matched the height of his VR couch with his IRL (in real life) couch that he was physically sitting on, so his enactment of sitting would look more natural. Those doing sign language or dancing tend to invest in the resources necessary for more extensive embodied self-presentation, displaying position and postures. For example, *Moondoodle* said:

> *I still had that thought in my head – I'm going to get full body some time. And then this will look cool… I use my Vive trackers on my feet, on my hip, on my elbows and I have two base stations… I'm pretty new to full body tracking. I haven't had it for a while. Like, I'm not used to seeing my legs yet. You know, I still forget sometimes that I do have them… I felt like I was actually dancing, you know?… but [my friend] is a desktop-only user. So she doesn't have arms and legs and stuff. So, it's like she's handicapped [in the metaverse]. She doesn't have arms, legs. Poor girl..*

2.3.3. World Affordances

As users build worlds within the platform, they also create situational resources that enable self-presentation. These resources refer to various elements and features within the world that allow users to express themselves and present their identity in different ways. This could include interactive objects, settings, and other creative elements that contribute to the overall self-presentation experience within the metaverse platform.

2.3.3.1. World Feature Control

The first component of world design affordances is the world feature control. A wide range of features can be enabled by the user within a world. Each world creator designs unique or convenient features based on the specific needs and purposes of the world. Some features may require a password set by the world creator, while certain areas of the world may be restricted to specific members of a group. However, in most cases, the world features are open for anyone to use and express themselves through.

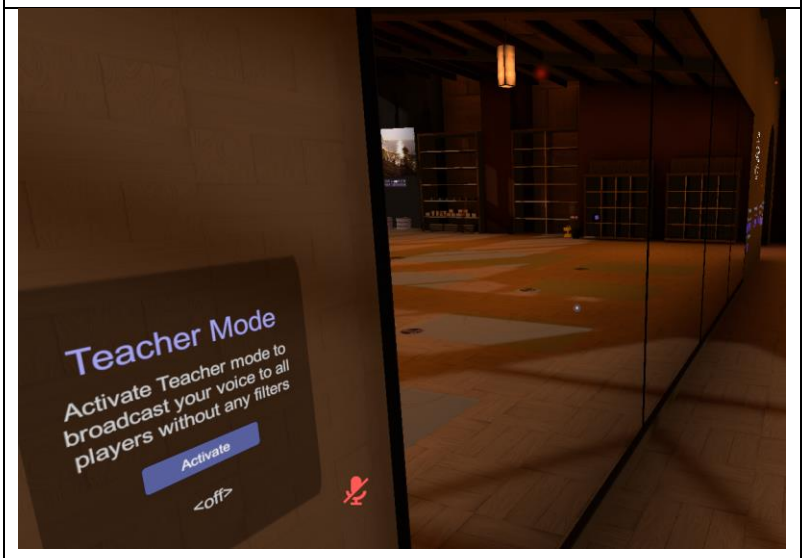
For example, as shown in Figure 11-A, *Pastor_Mike* added the ***become a presenter*** affordance to his MetaChurchVR world. Unlike other metaverse churches where only pastors are allowed on stage, activating this affordance allows anyone to approach the podium and speak, presenting themselves as a teacher. This feature enables individuals to take on a teaching role and share their knowledge or insights within the metaverse church setting. This feature can be called as many different names, based on the decision of the world creator. For example, this is called a "teacher mode" in the Virtual Reality Dance Academy's yoga class world. The VRChat website includes a forum menu specifically for developers, including world creators, to submit requests for additional features to the VRChat admin[14]. This forum serves as a platform for developers to communicate their needs and suggestions, allowing them to make requests for new features or improvements to enhance the VRChat experience.

[14] Source: https://ask.vrchat.com/t/3-feature-requests-additional-audio-options-for-performers/16459

Figure 11. World feature control in VRChat worlds



A. Pastor Mike's MetachurchVR world with a "become a presenter" feature on the back side of the podium, available to be used by anyone



B. Virtual Reality Dance Academy's yoga class world with a "Teacher Mode" feature on one side of the wall that enables whoever's voice to be easily heard by everyone in the room.

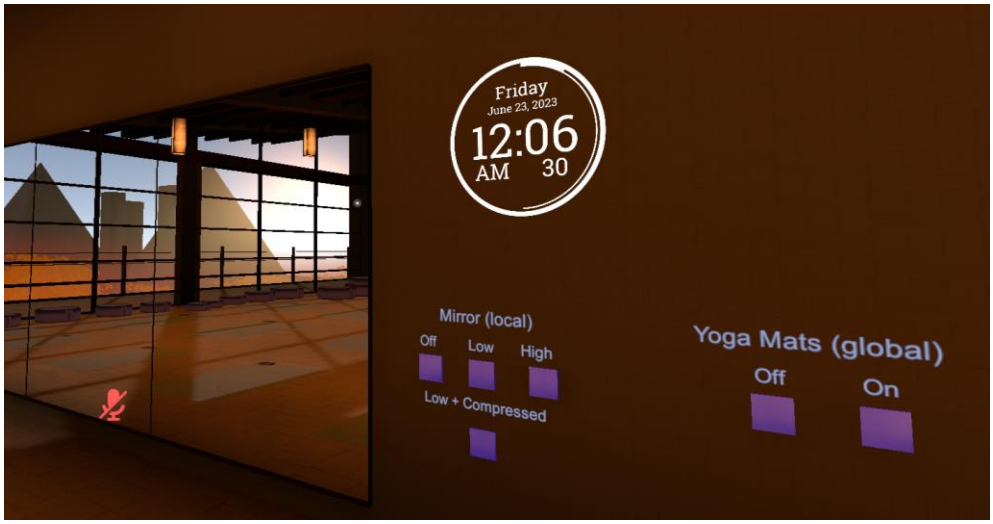
The world feature control, even within the same world instance, can be differentiated by an additional feature called ***local setting*** and ***global setting***. These features are enabled

by users (virtual-)physically clicking the designated button created by the world creator. The local setting allows the applied feature to be exclusively applied to the user themselves, while the global settings will be applied to everyone in the world instance. The “become a presenter” and “teacher mode” features are both global settings. In Figure 11-B, the Virtual Reality Dance Academy’s yoga world showcases the local feature that enables the mirror at the front of the yoga room to be in four states: off, low, high, and low+compressed. These settings exist for lower-tier technology users to be able to use low-quality mirror settings and enjoy the session together with other high-level technology users, but with a lower chance of lag in their VR system.

If a user is not familiar with the difference between the local and global settings, complications can arise. For instance, while observing and participating in a yoga class, I approached the world creators, who was also attending the class, and expressed my concern about having an unstable VR experience as a standalone Quest user. They advised me that disabling all features might improve my VR experience. Encouraged by their suggestions, during the next yoga class, I walked up to the front and disabled every feature displayed on the wall. However, to my surprise, the teacher suddenly mentioned:

> *Hey, we have a trouble-maker here.. Who made the yoga mat all disappear.. You’re not supposed to touch the global settings..*

Figure 12. *Local* vs *global* world feature control in a VRChat world



That happened because I was not aware of the difference between the local and global settings. The image in Figure 12 shows what a “High” quality mirror (local) feature looks like – it shows the whole room just like a normal real-world mirror. The “Low” quality setting in the mirror will only display the user with a blurred or greyed-out screen, while the “Off” setting completely removes the mirror and only shows the surrounding walls. In exercise sessions where it is important to observe the teacher’s posture as well as your own, turning off the mirror completely can hinder the overall experience. The drawback of using the low quality or off mode is that I was unable to see the teacher’s reflection in the mirror, even though I could still participate in the yoga session. However, individuals sitting next to me may have the “high” quality mirror mode enabled for their local setting, and they wouldn’t experience the same difficulty with the yoga session. They may not even be aware that I am not seeing the same mirror as they are.

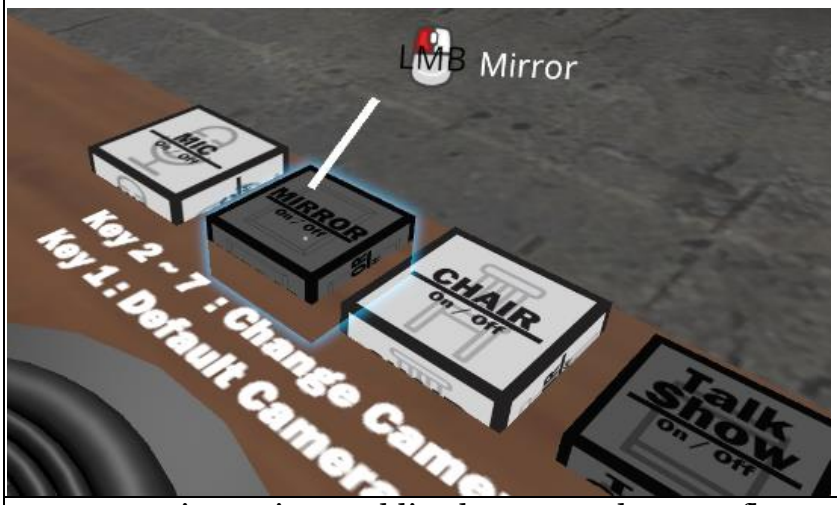
2.3.3.2. Situation Control

The second component of world affordances is situation control. In the world created specifically for stand-up comedy and performances, such as the "Charming Show" depicted in Figure 13, situation control allows users to express themselves to their fullest capacity while maintaining maximum comfort. The performer has control over the stage, with the audience seated on one side, resembling a stand-up bar. They can adjust the mic's height, change the background to resemble a TV talk show, or place a large mirror covering the audience's view. This empowers the performer to potentially overcome stage fright by avoiding direct eye contact with the audience and monitoring their own performance. Although they miss out on the audience's physical reactions, they can still hear their voices and applause.

Figure 13. Situation control with a stage mirror in the virtual world "Charming Show"



A. Normal view of a presenter with the mic in front



B. Mirror-view enabling button on the stage floor

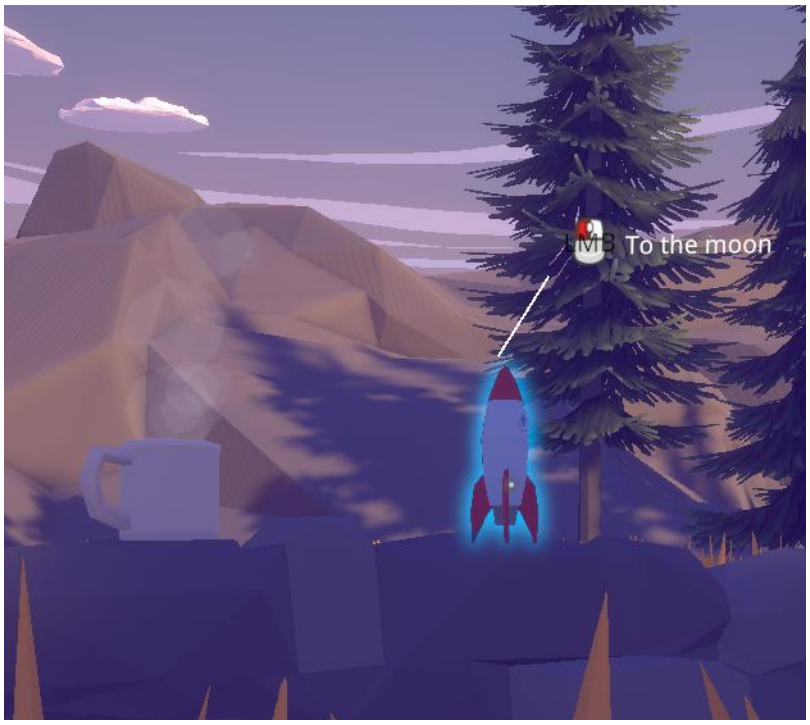


C. Enabled mirror view lets the presenter see herself.

I experienced another similar example during the interview. *AlienMan ab12* guided me to Amber Glade, a virtual Autumn Sunset Forest location, to showcase hidden clickable features that can change the scene. One such feature was a tiny rocket located next to a coffee mug. *AlienMan ab12* encouraged me to click on it, and as soon as I did, both of us were instantly transported to the moon floating above, where we conducted the interview. Once the interview concluded, we "jumped off the moon" and descended back to the spot where we had clicked on the tiny rocket. Interestingly, the coffee mug next to the rocket triggered a transformation of the entire scene from an autumn sunset (hence the name

"Amber" Glade) to a snowy winter landscape. This feature allows users to have control over the situation and showcases their mastery of the virtual world. Figure 14 shows the tiny rocket from Amber Glade.

Figure 14. Tiny rocket that sends the person who clicked it to the moon in "Amber Glade"



2.3.4. Identity Work to Navigate Liminality Due to Self-Presentation Affordances

As I navigated VRChat, I became aware that I was not always witnessing intended self-presentations. Disconnects arose mainly from how individual users' VR affordances expanded or diminished platform and world affordances; but they arose also from disparities in world affordances across platforms. These disconnects created moments of liminality when rules of self-presentation are suspended. This suspension requires identity work as both presenters and audiences renegotiate rules for self-presentation.

2.3.4.1. Liminality from Platform and VR Affordance Disconnects

I noted that I sometimes was not seeing users' avatars in the same way as they were being presented. The importance of shared affordance comes into play because it can make or break an experience for the users in metaverse platforms (Leonardi 2013). This stemmed from limitations in my or other users' VR affordances. Consider, for example, the following exchange:

> *Me: Am I supposed to see you as a floating half-body robot? Oh, are you on Quest right now? … Maybe it's not fully loaded.*
>
> *Meanwhile, Lyuma, showing off a very unique "interactive avatar" that he created that permits the viewer to change clothes on the interactive avatar user: So, the trick is, if you look up and down a certain amount… It's a little bit like going through a TV menu with two buttons… I spent literally a week on this because I just thought the concept was so unique that I wanted to do a good job presenting it as best I could, given the resources.*
>
> *Me: Really cool. I haven't seen an interactive avatar like this before.*
>
> *Lyuma: Because it is almost impossible to make something like this. It's very difficult. VR doesn't make it easy. They have the new Avatar 3.0, and anyone can make interactive stuff, but …everyone sees the same thing. [But my avatar allows everyone to see different things – different outfits – based on what they directly activated on my avatar.] It's hard to make something where each person can activate different outfits [like this avatar that I created]. They're looking at me, [each user] can change my appearance differently… If I could have made an easier user interface, I would have. But it's complicated because I don't know where you[r eyes and hands] are [relative to mine]…*

Though self-presentation was a struggle in this exchange, the presenter pursues identity work by ***accommodating*** his audience's limitations and taking it in stride. In contrast, consider my exchange below with *Pikapetey*:

> *So, the biggest concern I have is sync issues. So, does everybody see the same at the same time? That's what can really break an experience for me. If people are seeing*

> *different things at different times, that's very, very world breaking because then the conversation devolves into like, "Well, I see this, what do you see? Well, I see 'B'. What do you see? I see 'A'."... If you're hindering other users [by being a troll or overloading worlds to disallow other lower-tier technology users experience], you're in the wrong.*

Pikapetey, then showed me the world he had built and was testing. But when I told him I didn't see the colors that he mentioned, he got frustrated and barraged me with questions on how I saw his world and his avatar's facial expressions.

> *Pikapetey: Watch Toy Story 4. That's the newest Toy Story. And you're like, wow, that was amazing. And then immediately watch Toy Story 1 and you'll be like, oh, everything looks really bad. So, the PC [-user's view] is Toy Story 4, Quest users[' views] are Toy Story 1.*

In this way, *Pikapetey* attributes his self-presentation failure to my lack of desirable resources. In this way, he pursues identity work through ***blaming***, attributing his inability to portray himself as desired to me.

The main liminality stems from being a standalone Quest or PC user and their technological setups. Standalone Quest users face limitations in graphics. However, they do not face limitations in other affordances. That is because features like gamer tags, group tags, and trust levels are indicative rather than graphical. Gamer tags show no difference between standalone Quest and PC users. Trust level icons had similar shapes but slight color variations. For standalone Quest users, the "Fallback" indication appeared as a basic red (#FF0000), reflecting technical inferiority. Figure 15 shows a comparison of the indicative features – gamer tags, group tags, and trust levels – between PC users and standalone Quest users, there were no visual differences in what they see. Both user groups perceive the same indications, indicating uniformity across platforms.

Figure 15. Comparison between what PC users see and what standalone Quest users see on the indicative features: Gamer Tag, Group Tag, and Trust Level



A. PC User View	B. Standalone Quest User View

Some things to note from Figure 15 is that a standalone Quest user, when making their VRChat account in the first place without having a gaming PC, gets an indication code number that is randomly generated. The "Visitor" marked with a red circle whom I "Blocked" from my view has a gamer tag named *chinboy123 89bd*, separating the four-digit code with a space from the gamer tag that the user created. The " 89bd" part of the gamer tag was automatically generated by the system for this user due to being a standalone Quest user. When I was interviewing *AlienMan ab12*, I was able to recognize it immediately:

> *Me: Are you also like an Oculus [standalone Quest 2] user, like myself?*
> *AlienMan ab12: Yeah. [You recognized] the thing like the four-digit number..*

Based on the observations, I have noticed that the four-digit indications sometimes act as a scarlet letter for standalone Quest users. Other users would just walk away after they look at the gamer tag with that four-digit code.

Some noticeable graphical difference for gamer tags is that, when a person is talking, PC users will see a white ripple effect with a light blue contour effect around the gamer tag. For standalone Quest users, the gamer tag will only have a light blue contour effect. Figure 16 shows the comparison between the two different views.

Figure 16. The ripple effect on the gamer tag shown for PC users to indicate which person is talking



A. PC user view: The white ripple effect and light-blue contour highlight effect shown on gamer tags of whoever is speaking (sometimes the white ripple effect does not appear when the sound is too soft or if it does not sound like a person talking)



B. Standalone Quest user view: Only the light blue contour highlight effect shown on gamer tag of whoever is speaking

These views with all the details on the gamer tag including the group and the trust level appear when a user pulls out the menu pop-up screen. In normal view, users may decide to set the setting differently so that they will only see the gamer tag and group, just the gamer tag, or nothing. On viewing the gamer tags, *Shnarff* mentioned how it could actually reduce the immersive experience in metaverse platforms compared to the real-world interactions:

> *I always used to have the nametags above [the head of each avatar]. I had. And I'm like, I turn that off [be]cause I was like one in the big, crowded areas. It was just annoying to look at everywhere… I kind of wanted that more feeling of I didn't want to see the nametag approaching from around the corner or theirs. I just want to see the person. And I wanted to, like, recognize them on sight… And it's just interesting how once you take away that nametag and you look in the details of the people[']s appearance of their avatars] and just like you recognize them on site and it's them, you know?… Like, I see everyone. I recognized you without … nametags. I still recognize a lot of the people I've seen before… [even if they are] changing different types of robot types. I still recognize the person, still them… it's absolutely still who they are. I don't have to look at their nametag. I just like, oh, that robot is Vinixia. Even though they look like a wind-up robot cowboy, [I] can still tell it's them because it [the style of the alternate avatar Vinixia chose] has their name written all over it, you know?*

Regarding how people get into finding their styles for each avatar, *Shnarff* explains how it is deeply related to people learning and creating their own avatar:

> *You know, you put in the time to make the rig… Once you have the tools which… you get…the ability to like create something [avatar] more personal. And you're the only one with those things [avatars]. [For example, take] Dustydustbunny's, avatar. You know it's going to be her. Like that's no one else. Yeah. Even like your avatar right now. I haven't seen anyone else [using it] yet, so it's like it's you. My perception of you… no one else is using it. So, like, there's so much, like, individuality already with being able to, you know, not only for yourself but to see other people as.*

Some custom-made avatars have exclusive graphical additions visible only to gaming PC users. While mingling with other attendees from MetaChurchVR after the sermon, I observed *spetemaster 195d*, who understood my inability to experience what he was experiencing as a gaming PC user. One avatar graphic, allowing an extra giant character to appear and dance in front of others, remained invisible to a standalone Quest user. *Spetemaster 195d*, another friend of ours, and I attempted to create a synchronized dance music video featuring our avatars and the giant graphic. However, while everyone else, including my friends, enjoyed the show, I couldn't comprehend why they found the scene intriguing. I asked a spectator to record the scene for me, but unfortunately, he made a mistake and the recording was lost. *Spetemaster 195d* and our friend got to know about this later and felt sorry that I missed the show. To this day, I remain unaware of what I missed and was unable to partake in the enjoyment of the gaming PC users.

Due to these differences, VRChat users tend to have a mutual understanding that others may not always see the intended avatars or even the same scenery of a world. When a user wants to ensure that another user is seeing the same thing, they first ask. However, when they realize that the other user is not seeing the right thing, they try to engage in identity

work by ***educating*** others as their strategy. *AlienMan ab12* continued to explain how to properly see his primary avatar instead of the fallback lower-tier avatar. He enthusiastically added questions to ask me, to double-check if I am following through without getting lost:

> *Uh huh. And you have, you have it in like your left hand to your right hand. Use your other hand to point. Point at me. Do you see me light up? Okay, so I'm lit up now. I hit the trigger with the same hand. Uh, like, you're like you're holding a gun in the end of the trigger right here, you know, hit the trigger, and it'll show. It'll show Avatar display. Then click on the eyeball... Oh, I have a character display... uh, avatar display. There's a little eyeball there that's not crossed out. You click on that and then it should reveal that I am. Yeah. Okay. You see the Rick Astley?*

Figure 17 shows the effort *AlienMan ab12* put to show me his intended avatar, a replica of *Rick Astley*, a singer from the 1980's.

Figure 17. *AlienMan ab12*'s fallback avatar, teaching me how to enable the eyeball to reveal his intended avatar, and the intended avatar which is a replica of *Rick Astley*



A. *AlienMan ab12*'s fallback avatar	B. Finding the eyeball menu from the User Actions > Avatar Display menu icon box (it has the eyeball to reveal the avatars, eyeball with a diagonal line to conceal the avatar, and the default setting of blocked view of which the function is the equivalent to the avatar conceal icon)	C. *Rick Astley* avatar which *AlienMan ab12* wanted me to see

2.3.4.2. Liminality from World and VR Affordance Disconnects

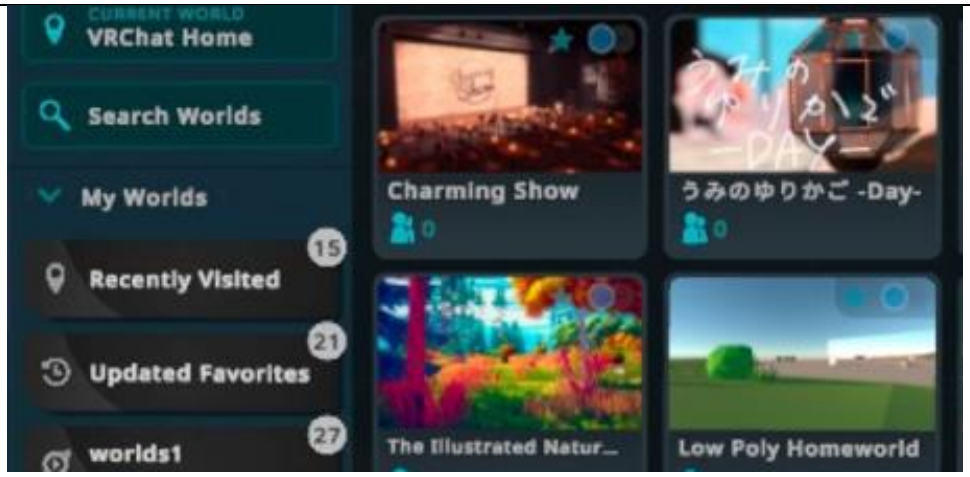
The main issue regarding the platform and VR affordance disconnect is the lack of access to VR affordances for standalone Quest users. VRChat was originally designed as a PC game, which means that Quest users are unable to enter PC-only worlds, as they are blocked from accessing them. To overcome this, content creators need to make their worlds and avatars "Quest compatible." However, due to the recent rise in standalone Quest users, many creators are reluctant to put in the extra effort required for Quest compatibility. Moreover, there is a stereotype that Quest users are younger and less sophisticated, leading some individuals to intentionally avoid interacting with them by hiding their avatars[15]. This misconception results in mistreatment of Quest users in general. By not updating their worlds to be Quest-compatible, creators can naturally evade Quest users who might be perceived as bothersome. This perception arises from the fact that Quest 2 users, who are often children receiving the VR device as a Christmas present, cannot afford an expensive gaming PC or more costly full-body trackers[16]. Figure 18

[15] Source: https://www.youtube.com/watch?v=IrCJG3n04A0

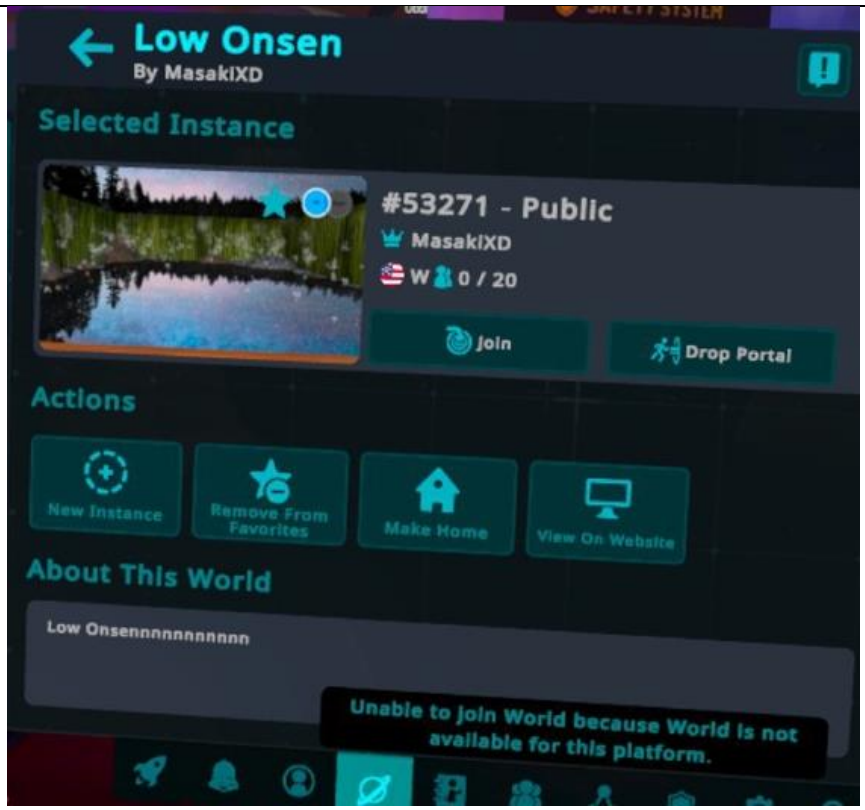
[16] Source: https://www.youtube.com/watch?v=f-Z5VFNsy4o

illustrates the challenges faced by standalone Quest users, particularly Quest 2 users, when encountering search results or portals to PC-only worlds, thereby limiting the metaverse experience for users on a tighter budget. This limitation of inviting only specific individuals into certain worlds (such as the PC-only worlds) is based on ***preferential attachment***, where users with similar technological resources interact with each other.

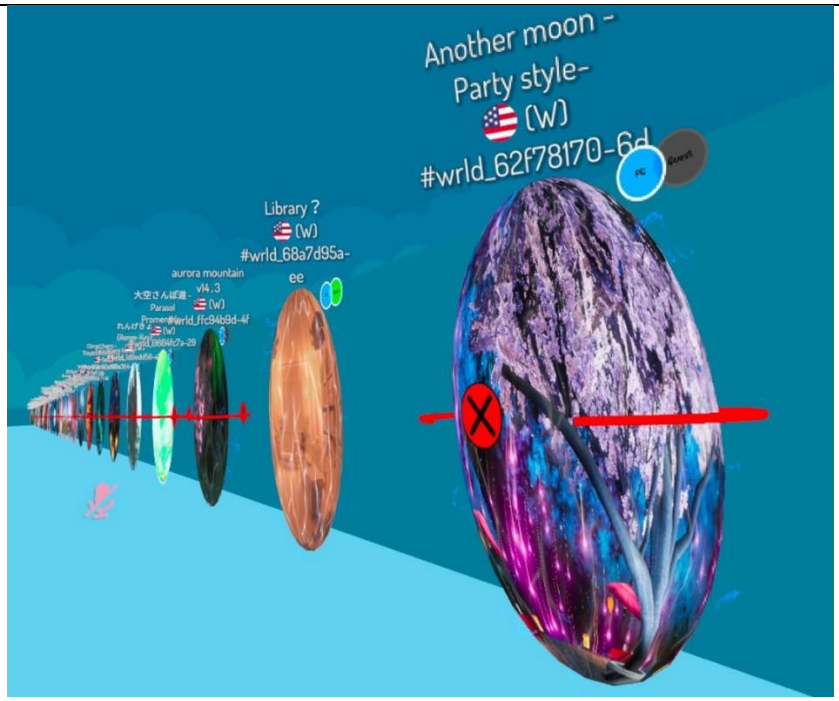
Figure 18. Standalone Quest Users' Limitations to Accessing PC-only Worlds



A. List of PC-only worlds (marked as PC-only)



B. PC-only world indicating Quest user's inability to have access



C. Among the list world portals which are recommended worlds to visit, the only Quest-compatible world was the "Library?" world, and all PC-only worlds' portals show a discouraging X mark with a red band around it.

The inability to access certain metaverse worlds severely limits the potential for immersive experiences. This restriction hinders standalone Quest users from fully expressing themselves and forming connections in PC-only worlds. I observed instances where, following a Cornerstone VR church session, the group desired to explore worlds for mini-games and enjoyment. However, the presence of standalone Quest users prevented the entire group from entering PC-only worlds, leading to disappointment. A similar situation arose when Pastor DJ Soto attempted to organize world-hopping activities, struggling to find Quest-compatible worlds that catered to everyone's preferences. In my observations of other groups like the VR Dance Academy, they also encountered difficulties in locating worlds where the entire group could engage in fun activities together due to the inclusion of standalone Quest users. In line with these experiences, *spetemaster 195d* made a comment after realizing that I had logged in as a standalone Quest user:

> *All right, let's see. See how well this one does? My default world is an island filled with a bunch of ducks, so it's not the most quiet... [but] the Bird Sanctuary [world] is one of my favorites... All of them are [Quest-]compatible... Oh, crap. Some of these are the ones that I like [but are not Quest compatible]... Yeah, that's the thing. A lot of the ones that I favorited, I didn't realize that there's a difference between Quest, PC and Quest or just PC. But, you know, in Bird Sanctuary, that's Quest compatible, so we might as well go there. I'm going to drop a portal...*

After the interview, we accepted some other friends into the Bird Sanctuary world that we were holding the interview in, and *spetemaster 195d* commented again:

> *There are so many options to choose from among PC-only worlds. There are more interesting worlds among PC-only worlds. Like, there is this world you can actually swim under the ocean. But that's a PC-only world.*

Due to my unavailability of a gaming PC, I had to forgo the opportunity to experience swimming in that world. Consequently, I had to abandon the idea of visiting that particular

world. After that, I felt motivated to start saving up money to buy my own high-end devices, and I ended up purchasing a gaming laptop. My friends from the VR Dance Academy were very excited to hear that I had bought a gaming laptop and cheered that we could now perform together as full-body dancers. They encouraged me, saying that I would get used to it, and shared how they had also invested in more devices until they acquired the full set of full-body trackers. Choosing my identity work in the metaverse resulted in an upgrade to my self-presentation because I gained access to more activities, a greater variety of avatars, and the ability to visit PC-only worlds. My strategy, along with that of my other friends, to overcome this liminality was through ***investment in upgarding self***.

2.3.4.3. Liminality from Platform and World Affordance Disconnects

I collected my data from various metaverse platforms, such as VRChat and AltspaceVR. However, each platform has its own set of allowances, resulting in differences in users' experiences and avatar content when transitioning between platforms with distinct world affordances. Therefore, when users decide to create and hold events or participate in a world, they make a ***platform choice*** based on their preferences of the avatar, platform functions, and features the enables the proper affordances users are looking forward to. For instance, while VRChat accommodates a wide range of avatar designs, the majority of avatars resemble cartoon characters. On the other hand, AltspaceVR avatars have a Lego-like style, lacking legs and arms but featuring hands. In AltspaceVR, the gamer tag is not displayed by default, whereas in VRChat, it is. Additionally, in AltspaceVR, users can click on someone standing far away and send a text message, while in VRChat, physical

proximity is required to interact. Legs hold greater significance in VRChat, evident from the emphasis on full body tracking and recent advancements in Full Body Estimation programs. Figure 19 depicts the floating navigation method used in AltspaceVR, while Figure 20 showcases the inevitable differences in avatars between AltspaceVR and VRChat, as exemplified by *Meta Angel*, *Pastor JayPo*, *Chedders C*, and *Pastor Goose*'s avatars.

Figure 19. Pastor Koko's AltspaceVR Sermon when everyone was climb-floating up the hill without having use their legs



Figure 20. AltspaceVR avatars (above) and VRChat avatars (below) of the same people from Cornerstone VR Church



Chedders C, who had a fondness for his AltspaceVR avatar featuring a green striped fedora and a Christmas-themed outfit, mentioned:

> *I wish I never took the time to port that over to VRChat. Um, so, so far, I'm just done [with migrating] this world now [from AltspaceVR to VRChat]. It's [difficult and time consuming] probably because I've never delved into bone structures [which is a crucial part of VRChat avatar movements]. You know, I was looking into it a little bit*

> *with this avatar so I could understand, like, how do you set up the bones for, um, the Altspace avatars. But I never got around to it. This is the one that I. used at the most recent service in VR MMO Church. But then the one I'll often use is this one [Zelda avatar] at Cornerstone VR just because it's very likable and it's a little bit shorter, allowing other people to feel like they have more freedom to speak…*

As *Meta Angel* expressed her fondness for her avatar in AltspaceVR, she also discussed the recent shutdown of AltspaceVR by Microsoft, expressing her deep disappointment:

> *They didn't care about the people and obviously didn't care about the people on the platform. And so you're going to see all these features and characters and other Microsoft products, but they didn't care about all that space. So. Oh, yeah. I'm a software engineer at Microsoft, so Microsoft is a huge vendor for life, has been right for business. Also, I'm pretty sure every business works with Microsoft, you know?…*

Continuing on, she proceeded to showcase her ability and expertise in bringing the AltspaceVR world to other platforms. This capability allowed her to successfully transfer the world design across different platforms:

> *I like VR, because this is code and art and video games and coding art… I learned how to build and I would say deploy worlds in Spatial and it uses Unity. So you could put anything that was in Altspace that was made like in Unity… You could put that in Spatial… I cut out a big piece that I want to use and I put that into Spatial and it's summer mode right now. The [Cornerstone VR Church campus in] Meta Horizon world is like a campground one, and then the [Cornerstone VR Church campus in] VRChat [is] a space[-ship] one. So, we have like basically two campuses and a hub in Spatial and the hub in Spatial is like from the one that was in Altspace… There's a couple tricks that you just have to learn though with the textures. But I like learning new things. So it felt really good when I built in Spatial and, everybody was so happy to see Altspace in Spatial, kind of…*

Meta Angel's success story involves successfully transferring the old AltspaceVR church world design to another platform. Within their network, they have the expertise of at least two IT professionals, *Meta Angel* and *Pastor Goose*. However, the situation was different for VR MMO Church when they decided to shift their church world from AltspaceVR to Rec Room. One of the challenges faced by VR MMO Church was their struggle to recruit

permanent IT personnel as part of their network. During the interview, there was a conversation between *Pastor Alina* and me. Given that *Pastor Alina* was already conducting sermons for children in Rec Room, she appeared to be responsible for instructing other pastors on how to create content in Rec Room.

> *Me: So you don't really do world creation like the hard coding, but you would still design your own, say, your sermons based on, like, the Bible of the day, right?*

> *Pastor Alina: Mm hmm. Mm hmm. And, and Rec Room and an Altspace, because Altspace had a way that anyone could create in Altspace as well, like Rec Room. And so in both of those spaces, I'm learning right now so much harder in Rec Room. But I help to do the building. I help to create the spaces. So I get in, and whether I'm teaching it [creating Rec Room space] that week or not, I'm almost always involved in the creation.*

Pastor Alina further highlights the benefits of conducting sermons in Rec Room, aligning with the VR MMO Church's approach of incorporating Bible verses into the world design for each week's sermon. *Pastor Alina* states:

> *I think rec room has a lot of really, opportunities. Like here in VRChat, the people have made some really cool spaces, but you're, you're limited to what other people [world creators] have made unless you happen to be someone with the skills. And it's a real skill. Like not just anybody can create a space here Rec Room, just anybody can create a space. So I love that ability in Rec Room, just like we did in Altspace. We're building whole world for our sermons. We're here. It's up on the stage and it just makes it more. I don't know. I like that. I really like that having the world built for the teachings that we're doing. But play. Oh, VR[Chat has] some really cool play, even flying planes in a reasonably decent environment. Here in VRChat that is awesome. Rec Room have play, but … Rec Room is not as fancy as is here [in VRChat] I guess. But then again these are user-created spaces over there and these are people that actually have some serious skills.*

However, *Pastor Alina* discovered that Rec Room did not provide the ideal environment for user-generated content, contrary to their expectations. She shared the concerns that arose once VR MMO Church began conducting their main sermons in Rec Room:

> *Rec room has some really weird things. I'm actually kind of worried about services going forward because I guess they're always listening, which really creeps me out. [The Rec Room administrators], they're like always listening. People are getting in trouble because they said a thing like, um, someone from church was saying "someone else said something" and she was like, "Come on, that's not appropriate. You can't say blah, blah, blah." And then the bot that is always listening like, oh, the "ding"-ed her [with an alert sound] like "You're in trouble, you said blah, blah, blah. Now you say blah blah, blah or anything like that. One more time and you're going to [get] like timeouts as if you're children."*

Pastor Alina continued to express her concerns, expressing a sense of unease and feeling threatened by the possibility of their church service being discontinued:

> *And then they ban you. If you've had too many timeouts or something. I don't know. I'm just discovering this in these last few days. And so, I'm like, oh, sometimes like scripture, you know, going through scripture, talking about death and we talk about sex comes up, and I'm worried. Are the bots going to come and like, tell us we can't do church anymore and or everything or how's that going to work? ...unexpected... Yeah. Big surprise. Like literally within 48 hours. I figured that out. I just found out...*

Furthermore, she went into detail about her frustration regarding the upcoming Easter play that they had been planning:

> *For Easter, ...we like to get people involved so they're not just listening. In Rec Room, they can put on costumes and be the people we're talking about. Some of the people are going to be the crowd that has turned against Jesus... [everybody will be saying] Kill him... crucify him... And we made little signs that say, like, kill him or crucify him or whatever. And I'm like, ... are we going to get in trouble for these signs? [We will get to know] how sensitive they are. So, we'll see.*

As mentioned, *Pastor Alina* had concerns about the potential limitations on freely expressing their thoughts and conducting church activities. This restriction not only affected their role as pastors but also hindered their ability to express themselves fully. It

was evident that this limitation could also impede the self-expression of the attendees within the church community.

Pastor Mike, being the youngest pastor with a strong passion for technology and seeking autonomy, had been actively involved in VRChat for the past five years. Due to his extensive experience, he was well aware of the limitations posed on platforms other than VRChat, including AltspaceVR, which he had experimented with on several occasions. He mentioned:

> *Not as much as other people, technically-wise. But I understood how certain things work [in VRChat]... In the past, I did fool around with AltSpace [to socialize], which is very similar to VRChat. Less diverse Avatar, in expression, but more event focused. But I did spend some time there... There was [a specific purpose for me to build my church in VRChat]... I found that most people that are truly trying to escape reality or maybe fit into like an identity or maybe are struggling a lot, seem[ed] like most of them were here [in VRChat]. And there weren't as many churches here specifically. So, I thought maybe I could reach this specific demographic of people. And that's proven true... [What] AltSpace does very good is the event scheduling. And you can, you know, say, hey, I'm coming to this event, and they have it all. It's really event focused, but in VRChat, you can do anything you want. So, VRChat, I prefer a lot more.*

Pastor Mike had a specific target demographic that he aimed to connect with, and he recognized the limitations that hindered his freedom of expression as a pastor reaching out to individuals seeking an escape from reality. Consequently, he did not feel compelled to establish another church on a different platform. Despite this, *Pastor Mike*, who has grown into a tech-savvy pastor, continues to excel in his endeavors. Hence, I realized that when people try to express themselves as pastors, event organizers, or simply exist in the metaverse, they ***compromise*** on their control in virtual worlds.

2.4. Discussion

In this work, I set out to understand the affordances for self-presentation in the emerging metaverses and, noting the layering and complexity of those affordances, how people manage the uncertainty surrounding those affordances. Though our data analysis is yet under way, early insights confirm the complexity of self-presentation affordances and the uncertainty they bring to self-presentation endeavors. They also highlight the disparate ways in which users navigate that uncertainty. Below, I briefly discuss how our work contributes to the source literatures upon which I build.

2.4.1. Self-Presentation and Identity Work

Our work problematizes self-presentation in the metaverse. I observed knowledgeable actors (i.e., who are conversant with the different features and functions in the metaverse or who knows computer programming and coding well) to engage actively in self-presentation and audiences to respond to and negotiate these self-presentations. When breakdowns occurred between actors and their audiences, one identity work strategy I observed was that actors and audiences undertake to preserve the actor's face and help him optimize his self-presentation. In another case, the identity work I observed took on the nature of blame, where the actor preserved his face by ranting at his audience. Disentangling these identity work strategies is crucial if we aim to effectively navigate our interactions within metaverse platforms. This becomes especially significant as individuals with varying resources and abilities participate in metaverse experiences.

2.4.2. Affordances for Self-Presentation in the Metaverse

Our work highlights the layered nature of affordances for self-presentation, the possible digital divide that might occur as metaverse userbases increase, and the possibility for disenfranchisement of those with access to poorer resources. Notably, such users may experience platform sanctions vis-à-vis their assigned trust levels as wealthier users band together to kick out or block the user from a world.

Figure 21. Layered Affordances for Self-Presentation in Metaverse Platforms

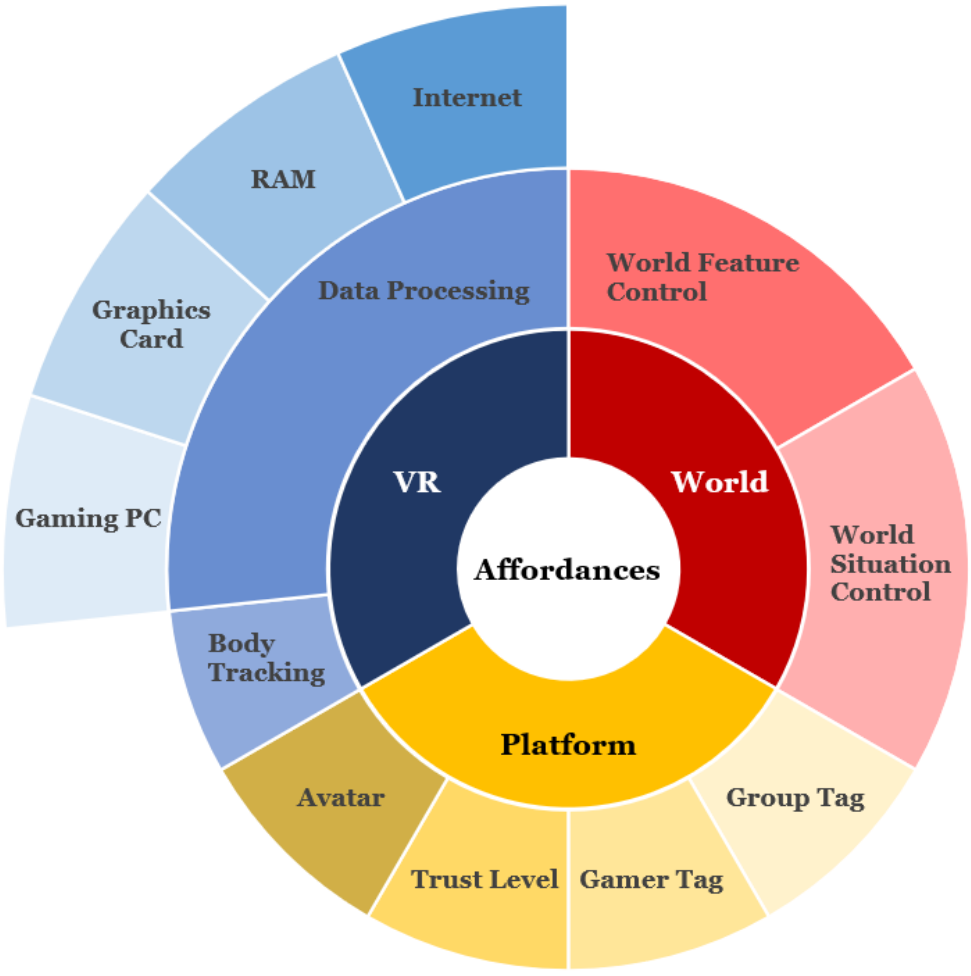


Figure 21 shows the layered affordances for users in a metaverse platform. Self-presentation is complex, involving multiple components simultaneously. This is distinguishable from in the real world where we only focus on attitude, behavior, and skills.

In simpler terms, self-presentation in the metaverse demands additional skills to engage in activities and express oneself effectively.

2.4.3. Implications for Practice

Our work has consequences for organizations wishing to leverage the metaverse, suggesting a need to attend to leveling the playing field across organizational members, or at least among members of communicating teams. Our work also calls attention to the need to better understand this critical problem and how cognizant actors are able to solve it.

3. INSTITUTIONAL WORK TOWARD FORGING ACTOR NETWORKS FOR NETWORK INNOVATIONS

An enduring problem information systems researchers have been facing is how to promote the adoption of technology innovations in situations where their benefits are contingent on others' adoption and use, i.e., when the innovation is subject to network externalities. Prior research has of course highlighted the relationship between network size and adoption. These networks have typically been subject to the prospective adopter's fiat or financial incentives (Kauffman et al. 2000) or have been the pre-existing network of adopters (Zhu et al. 2006). However, diffusion of innovations subject to network externalities is a pernicious problem when the network is not subject to fiat or financial incentive and does not already exist.

An answer to this collective action problem has been an institutional work perspective. Institutional work is "the purposive action of individuals and organizations aimed at creating, maintaining and disrupting institutions" (Lawrence and Suddaby 2006, p. 215). Innovations diffuse through the institutional work of interpreting and legitimizing an innovation, and mobilizing a community around it (e.g., Swanson and Ramiller 1997). But who performs such institutional work? A key actor in institutional accounts of innovation diffusion has been the institutional entrepreneur – persons "who leverage resources to create new institutions or transform existing ones" (Maguire et al. 2004, p. 657). These actors have been founders of organizations (Johnson 2007), designers (Henfridsson and Yoo 2014), and chief digital officers (Tumbas et al. 2018a). These actors typically are a single actor or single category of actor, evoking what Zucker (1987, p. 455) termed "the 'Great Man'" account of institutional change. This perspective is challenged by actor

network theory, in which change is viewed as "the process by which actants in a network mobilize support by making a unified whole from different interpretations, meanings and motivations" (Lawrence and Suddaby 2006, p. 242). A related perspective highlights the role of standing groups such as professional associations in the performance of institutional work (Greenwood et al. 2002). Some innovations may lack a standing group that is sympathetic to it. Others may depend on a heterogeneous set of actors. One exception to a singular or homogeneous actor account was provided by Wang and Swanson (2007), who considered the collective action by a heterogeneous set of actors in effecting the diffusion of professional services automation software. Building on their work, I therefore ask the question: *What are the institutional work practices associated with forging a network of actors with disparate motivations toward diffusion of a network innovation*?

Because I want to understand the constitution of a heterogeneous network of human actors and non-human contributors to diffusion, following Lawrence and Suddaby (2006), I draw also upon actor network theory (ANT). Rather than concerning themselves with social structure, researchers using an ANT lens concern themselves with the interactions through which networks of human and non-human "actants" are forged and deployed toward a legitimating project. I therefore look for the practices that "support and reinforce coalitions and alliances between distinct networks of actants with different objectives or goals" toward legitimating a particular digital innovation (Lawrence and Suddaby 2006, p. 242). Following Lawrence et al. (2011), I look for three types of practices – those involving ***projective agency*** that is forward-looking, strategically attempting to (re)shape a situation – here an actor network; those involving ***managing exigencies*** or problems

arising in the emergent actor network; and those involving ***developing habits*** that are subsequently invoked automatically to reproduce the emergent actor network.

The Metaverse Church offers a unique opportunity for understanding how network innovations diffuse. This is a recent phenomenon wherein some evangelical Christian pastors have been trying to harness Metaverse affordances toward extending their reach. Because these pastors initially lacked the support of their ministries – in fact, were often opposed by them – they did not have an extant network in place from which to mobilize for the collective action necessary for the diffusion of their Metaverse churches (Kelly 2018). This phenomenon therefore provides us with an excellent opportunity for understanding how the network necessary for the diffusion of a network innovation is forged.

3.1. Literature Review

Some claim that the metaverse has yet to come, however there have been a variety of research that talks about or describes what the metaverse should possibly look like. In the next sections I provide a brief review of knowledge about the Metaverse, about the diffusion of network innovations, and on institutional work.

3.1.1. The Metaverse

The Metaverse offers users a synchronous and persistent experience in digital space (Ball, 2021). The 3D virtual worlds in the Metaverse are real-time and hosted on interoperable networks at massive scale (Ball, 2021). The term "Metaverse" originates from the fictional work of Neal Stephenson entitled *Snow Crash*. In this novel, the Metaverse is a 3D virtual space populated by humans' programmable avatars, which interact with each other and

with software agents. This technology has fast burgeoned into a very real virtual reality. Today's Metaverse is a "parallel world" (Marabelli and Newell 2022), combining AR/VR technologies with platform technologies and AI into an ecosystem of experiences. The Metaverse permits users to navigate diverse experiences (Nickerson et al. 2022). They do so through *narrative composability*, i.e., permitting users to move seamlessly from one experience to another, *social assortativity*, i.e., permitting users to associate freely with those with whom they wish to, and *path discoverability*, i.e., enabling users to find avenues/locales within the Metaverse landscape (Nickerson et al. 2022). The development of pluralistic Metaverse experiences as well as designing for users' smooth navigation across experiences therefore represents a collective action problem. The Metaverse is therefore a network innovation. As such, it is subject to the adoption and diffusion challenges associated with such innovations.

3.1.2. The Diffusion of Network Innovations

Network innovations, i.e., those for which adoption benefits are subject to network externalities, pose a challenge for actors interested in promoting their diffusion. Unlike other innovations for which advantages may accrue to early adopters (Rogers 2010), benefits that accrue to the adopter depend on others' adoption and use, not simply on one's own. Prior research has, of course, highlighted the relationship between adoption and the size of the pre-existing adopter network (e.g., Zhu et al. 2006). Adopter networks can be anticipated when prospective adopters are subject to fiat or financial incentives, and such anticipations have also been found to relate to adoption (Kauffman et al. 2000).

To provide a better understanding of network innovation, I have included Table 5 and Table 6, which identify the different types of innovation and their antecedents. Here, I have identified several themes for network innovation: changing the way people perceive or contribute to innovation through network externalities (Agarwal et al. 2009; Belo and Ferreira 2022; Carter 2021; Ceccagnoli et al. 2012; Cheng and Liu 2012; Cheng et al. 2011; Davis et al. 2009; De Matos et al. 2014; Dickinger et al. 2008; Gallaugher and Wang 2002; Lawrence et al. 2002; Massa and O'Mahony 2021; Rogers 2010; Strader et al. 2007; Sun 2013; Swanson and Ramiller 1997; Uotila et al. 2017; Wattal et al. 2010), innovating the organizational aspect itself (Callon 1984; Callon 1987; Greenwood et al. 2002; Henfridsson and Yoo 2014; Lawrence and Suddaby 2006; Leblebici et al. 1991; Nielsen et al. 2014; Tumbas et al. 2018a), identifying regulations and policies related to innovation (Cats-Baril and Jelassi 1994; Maguire and Hardy 2009; Maguire et al. 2004; Nickerson et al. 2022; Orsato et al. 2002; Weitzel et al. 2006), identifying the factors that determine the critical mass (Markus 1987; Van Slyke et al. 2007), and adoption of a new technology itself (Asvanund et al. 2004; Duan et al. 2009; Feng et al. 2022; Guler et al. 2002; Kauffman et al. 2000; Parthasarathy and Bhattacherjee 1998; Wang and Swanson 2007; Zhu et al. 2006).

First, innovation is largely derived from network externalities. It is about changing the perception or behavior on innovation (Davis et al. 2009) or how people contribute to bring about an innovation (Agarwal et al. 2021; Belo and Ferreira 2022; Gallaugher and Wang 2002; Lawrence et al. 2002; Sun 2013; Swanson and Ramiller 1997). The network or the contributors play an important role to make the innovation effectively take place. However, in order for a network innovation to happen, institutional change needs to take place.

Whether the potential adopters perceive the network innovation to be beneficial and necessary plays an important role. Examples of possible antecedents include perceived usefulness (Dickinger et al. 2008; Wattal et al. 2010), perceived ease of use (Strader et al. 2007; Sun 2013), relative advantage (Cheng et al. 2011; Rogers 2010; Uotila et al. 2017), preference (Cheng and Liu 2012), or peer influence (Carter 2021; Ceccagnoli et al. 2012; De Matos et al. 2014; Massa and O'Mahony 2021).

Therefore, the second dominant category of innovating the organizational aspect itself comes into consideration. Some examples of antecedents that facilitate network innovation from literature are sense-making through institutional work (Lawrence and Suddaby 2006; Nielsen et al. 2014), entrepreneurship (Agarwal et al. 2021; Callon 1984; Callon 1987; Greenwood et al. 2002; Henfridsson and Yoo 2014; Tumbas et al. 2018a), and changing of the overall organizational structure (Leblebici et al. 1991). When the perception and institutional work get taken care of, policies and social norms to effectively implement the network innovation becomes crucial (Cats-Baril and Jelassi 1994; Maguire et al. 2004; Orsato et al. 2002) along with coordination in the standards and design of the society (Nickerson et al. 2022; Weitzel et al. 2006). In other words, social construction of network innovation becomes important (Maguire and Hardy 2009).

Network innovation is also influenced by the adoption itself in two different ways: ex-ante or ex-post. Ex-ante is about weighing the odds based on factors to consider, such as installation subsidy, consumer expectations, market concentration, or compatibility (Feng et al. 2022; Parthasarathy and Bhattacherjee 1998; Zhu et al. 2006). Guler et al. (2002)

assert the factors as institutional variables measured as strength of institutions, and organizational variables measured as firm's size, industry, and export orientation. Institutional entrepreneurship also plays an important role for ex-ante adoption decision making (Wang and Swanson 2007). Ex-post is related to whether the network innovation will be maintained or repeated in the future, considering multiple factors based on profitability and productivity (Asvanund et al. 2004; Kauffman et al. 2000) or social influence based on reviews (Duan et al. 2009).

Table 5. Themes of Antecedents of Literature on Network Innovation

Themes of Antecedents	Studies
Demographics	Callon (1984); Agarwal et al. (2009); Godinho de Matos et al. (2014); Belo & Ferreira (2022)
Attitudes (e.g., Perceived Usefulness, perceived ease of use)	Callon (1984); Cats-Baril & Jelassi (1994); Parthasarathy & Bhattacherjee (1998); Kauffman et al. (2000); Lawrence and Suddaby (2006); Strader et al. (2007); Strader et al. (2007); Dickinger et al. (2008); Davis et al. (2009); Wattal et al. (2010); Cheng & Liu (2012); Sun (2013)
Network Properties (e.g., size, social capital)	Strader et al. (2007); Van Slyke et al. (2007); Dickinger et al. (2008); Agarwal et al. (2009); Duan et al. (2009); Davis et al. (2009); Wattal et al. (2010); Cheng et al. (2011); Sun (2013); Godinho de Matos et al. (2014); Carter (2021); Massa & O'Mahony (2021); Belo & Ferreira (2022); Feng et al. (2022)
Innovation Attributes (e.g., cost, novelty)	Leblebici et al. (1991); Parthasarathy & Bhattacherjee (1998); Kauffman et al. (2000); Gallaugher & Wang (2002); Guler et al. (2002); Weitzel et al. (2006); Lawrence and Suddaby (2006); Duan et al. (2009); Rogers (2010); Cheng & Liu (2012); Ceccagnoli et al. (2012); Sun (2013); Tumbas et al. (2018)
Adoption Stage (early vs. late → observability of others' adoption)	Callon (1984); Callon (1987); Asvanund et al. (2004)
Other	Callon (1984); Callon (1987); Cats-Baril & Jelassi (1994); Swanson & Ramiller (1997); Parthasarathy & Bhattacherjee

	(1998); Greenwood et al. (2002); Guler et al. (2002); Asvanund et al. (2004); Zhu et al. (2006); Lawrence and Suddaby (2006); Wang & Swanson (2007); Davis et al. (2009); Maguire and Hardy (2009); Rogers (2010); Cheng & Liu (2012); Sun (2013); Godinho de Matos et al. (2014); Henfridsson and Yoo (2014); Nielsen et al. (2014); Uotila et al. (2017); Tumbas et al. (2018); Carter (2021); Feng et al. (2022); Nickerson et al. (2022)

Table 6. Antecedents of Literature on Network Innovation

Paper	Innovation type/purpose	Antecedents, i.e., Influencing factors (e.g., independent variables)
Callon (1984)*	Social and organizational aspects of innovation	• Technical objects: The scallops and the equipment used to cultivate and harvest them are technical objects that shape the practices and interactions of the fishermen and other actors involved in the translation process. • Human actors: The fishermen and other human actors involved in the translation process bring their own interests, motivations, and practices to the situation, which can shape how the translation unfolds. • Institutional frameworks: The rules, regulations, and norms of the wider social and economic system in which the translation takes place can influence the choices and actions of the actors involved. • Cognitive frames: The mental models and schemas that actors use to make sense of the situation and guide their actions can shape how the translation unfolds. • Linguistic representations: The language and discourse used to describe the scallops and the translation process can shape how actors perceive and act on the situation.
Callon (1987)*	Dynamics of innovation and the role of various actors involved in the process	• Technical objects: The material artifacts and technologies that shape social interactions and practices. • Human actors: The individuals and groups who design, build, and use these technologies, as well as those who are affected by them. • Social structures: The wider social, political, and economic systems that shape the development and use of technologies.
Markus (1987)*	Critical mass	• Universal access to a technology • Interdependence among users of the technology
Leblebici et al. (1991)*	Organizational and institutional aspects of innovation	• Federal Communications Commission (FCC) regulations • Changes in network structure • Changes in ownership structure • Technological innovations • Socio-political context
Cats-Baril and Jelassi (1994)	Development and deployment of the Minitel system (Télétel)	• Public policy measures (insignificant) • Public subsidies (insignificant) • Technical features • Application availability • Network effects

Paper	Innovation type/purpose	Antecedents, i.e., Influencing factors (e.g., independent variables)
Swanson and Ramiller (1997)*	Organizing vision in information systems innovation	• The organizing vision
Parthasarathy and Bhattacherjee (1998)	Post adoption behavior	• Perceived usefulness (not significant) • Perceived ease of use • Social influence • System quality (not significant) • Service quality (not significant) • Trust
Kauffman et al. (2000)	Elapsed Time to adoption of shared ATM network (network adoption and diffusion)	• Installation subsidy (insignificant) • Subscriber-level pricing (insignificant) • Installed base subsidy (significant) • Consumer expectations (significant) • Market concentration (significant) • Direct network effects • Indirect network effects • Compatibility • Relative advantage (statistically insignificant)
Gallaugher and Wang (2002)	Network effects in software markets (e.g., web server pricing)	• Web server price • Operating system • Network size • Web server market share Internet Service Provider (ISP) market share (insignificant)
Greenwood et al. (2002)	Transformation of institutionalized fields	• Institutional logics (professional vs. commercial) • Institutional entrepreneurs (presence/absence) • Organizational and environmental factors (i.e. size, tenure, stability, competition)
Guler et al. (2002)	Adoption and implementation of ISO 9000 quality management practices	• Global competition (measured as the extent of competition faced by firms in their respective industries) • Institutional variables (measured as the strength of institutions such as government regulations, industry associations, and professional associations) • Organizational variables (measured as the firm's size, industry, and export orientation)

Paper	Innovation type/purpose	Antecedents, i.e., Influencing factors (e.g., independent variables)
Lawrence et al. (2002)*	Transformative impact of interorganizational collaboration on the institutional landscape	• Interorganizational Collaboration
Orsato et al. (2002)*	Automobile recycling	• Political ecology factors: cultural norms, regulations, and policies that impact automobile recycling practices.
Asvanund et al. (2004)	Optimal size of P2P networks (availability; the impact of both positive and negative network externalities on the optimal size)	• Number of peers already using the file-sharing service • Number of files available for download • Number of searches performed (insignificant) • Number of failed search attempts (insignificant) • Number of unique artists (insignificant) • Number of unique albums (insignificant) • Number of unique songs (insignificant)
Maguire et al. (2004)*	Innovation on Approaches, policies, and practices to address the challenges and needs of people living with HIV/AIDS	• Shifting institutional logics and norms related to HIV/AIDS treatment in Canada
Weitzel et al. (2006)	Unified economic model that explains the diffusion of standards	• Standardization cost (significant negative effect) • Network effects (significant positive effect) • Network topology (not statistically significant)
Zhu et al. (2006)	Migration from proprietary or closed systems to open-standard	• Network Effects • Switching Costs • Compatibility (insignificant) • Complexity

Paper	Innovation type/purpose	Antecedents, i.e., Influencing factors (e.g., independent variables)
	interorganizational systems	• Standards Strength • Interoperability (insignificant)
Lawrence and Suddaby (2006)*	Creation, maintenance, and changes of institutions through institutional work	• Organizational and institutional field level factors (e.g. resource dependence, cognitive frames, regulatory systems) • Actors (e.g. managers, professionals, entrepreneurs) and their agency and strategic action • Institutional work strategies (e.g. resistance, diffusion, transformation) • Historical and temporal dynamics of institutional change
Strader et al. (2007)	Electronic mail (e-mail) and instant messaging (IM) systems	• Perceived network externalities (insignificant) • Perceived ease of use • Perceived usefulness (insignificant) • Attitude toward using • Subjective norm • Personal innovativeness
Van Slyke et al. (2007)	Role of perceived critical mass in the adoption process	• Perceived critical mass
Wang and Swanson (2007)*	Adoption and diffusion of Professional Services Automation (PSA) in the IT industry	• Institutional entrepreneurship
Dickinger et al. (2008)	Individuals' (technology) adoption behavior	• Perceived usefulness • Perceived ease of use • Perceived enjoyment • Social norm (insignificant)
Duan et al. (2009)	Online software adoption	• Social influence: measured by the number of user reviews and the percentage of positive reviews for a software product • Network externality: measured by the market share of the software product • Quality: measured by the quality score of the software product • Price: measured by the price of the software product

Paper	Innovation type/purpose	Antecedents, i.e., Influencing factors (e.g., independent variables)
Davis et al. (2009)*	Establishment of a basis for conducting research on metaverses	• Avatar customization: The extent to which users can customize their avatars in terms of appearance, behavior, and abilities. • Virtual world environment: The characteristics of the virtual world environment, such as the layout, design, and interactivity. • User behavior: The ways in which users interact with the virtual world environment and with other users. (However, this is a conceptual piece, therefore, no independent variables to test)
Maguire and Hardy (2009)*	Creation of new practices, norms, and structures in the emerging field of HIV/AIDS treatment advocacy	• Discourse • Actors' strategic use of language • Social construction of meaning.
Wattal et al. (2010)	Use blogs within an individual's network that increase own usage	• Network size (insignificant) • Network diversity • Perceived usefulness • Social influence
Rogers (2010)	Spread of innovations and its adoption within social systems	• Relative advantage • Compatibility • Complexity (not statistically significant) • Trialability • Observability
Cheng et al. (2011)	Exploring the impact of network externalities on the adoption, diffusion, and market share of open source software versus proprietary software	• Number of users of proprietary software • Number of users of open-source software • Number of open-source software developers • Number of proprietary software developers

Paper	Innovation type/purpose	Antecedents, i.e., Influencing factors (e.g., independent variables)
Cheng and Liu (2012)	Firm's profit gain from offering time-locked free trial software	• Optimal Price • Optimal Trial Time • Consumers' preferences for functionality and their software usage time • Risk-averse versus risk-neutral consumers • Lock-in effect of free trial
Ceccagnoli et al. (2012)	Mechanisms through which value is co-created and distributed within the platform ecosystem	• Firm size (insignificant) • Age of the firm (insignificant) • Development cost (insignificant) • Number of complementors • Number of complements • Market share of the platform • Age of the platform (insignificant)
Sun (2013)	Herd behavior on technology adoption and usage	• Network externalities • Perceived usefulness • Perceived ease of use • Compatibility • Relative advantage • Social influence (statistically insignificant)
De Matos et al. (2014)	Peer influence in the diffusion of the iPhone 3G across a number of communities (large dataset provided by a major European Mobile carrier in one country)	• Network size (statistically insignificant) • Average degree of social connectivity • Geographical clustering • Market competition • Income
Henfridsson and Yoo (2014)*	Challenging and disrupting existing trajectories, leading to	• Institutional entrepreneurship (a process of creating new institutions or transforming existing ones) • Institutional logics (competing sets of beliefs, practices, and values that shape institutional behavior)

Paper	Innovation type/purpose	Antecedents, i.e., Influencing factors (e.g., independent variables)
	potential shifts in institutional arrangements	• Liminality (an in-between period where existing institutional practices are challenged and new ones are created)
Nielsen et al. (2014)*	Institutionalization of IT in Danish home care	• Theorization and translation activities (conceptualization and interpretation of IT innovations, sense-making, testing, and experimentation).
Uotila et al. (2017)	Supply-side network effects shape the development of IT standards	• Compatibility (insignificant) • Installed base • Technology substitutability
Tumbas et al. (2018b)	Intersection between digital innovation and institutional entrepreneurship	• Digital innovation (not statistically significant) • Institutional entrepreneurship
Agarwal et al. (2021)	Peer effect on the use of Internet	• Income (statistically insignificant) • Education • Age • Gender (statistically insignificant) Social interactions
Carter (2021)	Competition between these two VR worlds	• Platform features (User Interface, Customization, Avatar control, Audio quality, Game mechanics) • Social features (Community size, Events, Moderation) Immersive features (Environment quality, Haptic feedback)
Massa and O'Mahony (2021)*	Participation architecture. (Analyzing the concept and finding how it enables self-organization among networked activists	• Creation of a participation architecture (e.g., creating a shared vision, building relationships, developing rituals and routines, creating a sense of ownership, managing roles and responsibilities)

Paper	Innovation type/purpose	Antecedents, i.e., Influencing factors (e.g., independent variables)
Belo and Ferreira (2022)	Investigating the phenomenon of free riding, which occurs when individuals or users benefit from the positive network externalities	• Number of friends with the same mobile operator (significant) • Number of friends with different mobile operators (significant) • Age (insignificant) • Gender (insignificant) • Monthly income (insignificant) • Education level (insignificant)
Feng et al. (2022)	Adopting new technologies or innovations	• Treatment condition (herding cues vs no herding cues) • Network size (statistically insignificant)
Nickerson et al. (2022)*	Coordination within the metaverse	• Design principles for coordination in the metaverse

The * mark for each reference indicates a qualitative study.

A parallel line of research has noted the salience of the presence of a “critical mass” of users – or of prospective adopter perceptions of a critical mass (Kauffman et al. 2000; Markus 1987; Van Slyke et al. 2007). However, the diffusion of innovations that rely on network effects becomes challenging when there is no pre-existing network or clear financial incentives. Kauffman et al. (2000) discuss the potential challenges faced by networks with network externalities, including the "chicken-and-egg" problem, where the value of the network depends on the number of users, but users are reluctant to join unless the network already has a substantial user base. This presents a coordination problem in managing reciprocal interdependencies. Scholars have emphasized the importance of social influence and other co-optative measures to facilitate diffusion (Markus 1987). Given this, it is worthwhile to investigate the role of institutional work, particularly in the context of network building, to address these challenges (Markus 1987; Van Slyke et al. 2007).

3.1.3. Institutional Work as a Solution for Collective Action Problems

One of the major issues that institutional work face is that a collective purposive action is required to maintain (or disrupt) institutions (Lawrence and Suddaby 2006). Such institutional work is imperative to the diffusion of innovations (e.g., Swanson and Ramiller 1997). Prior research has developed insights into several work practices associated with the institutional creation necessary for innovation diffusion. These include advocacy, creating rule systems and identities, reestablishing the links between practices and their normative foundations, network construction, mimicry, theorizing, and educating (Lawrence and Suddaby 2006; Maguire and Hardy 2009). Some of these practices necessitate network (re)creation work. For example, in describing the emergence of the Palestinian child

nutrition proto-institution, Lawrence et al. (2002) highlighted the salience of the network of diverse actors with heterogeneous motivations. Other researchers have similarly highlighted the role of networks in fostering the diffusion of standards (Guler et al. 2002), in promoting recycling (Orsato et al. 2002), and in creating new institutional structures (Leblebici et al. 1991). However, these studies do not provide insights into the specific institutional work practices associated with forging the network. The metaverse is a virtual space where the physical presence and real-world obligations does not apply. Hence, possibilities of collective action problem always exist. In addition, exploration in the context of the metaverse of such institutional work practices has not been provided yet in prior literature.

In attempting to move forward my understanding of institutional work practices, I adopted what Lawrence and Suddaby (2006) suggested – complementing an institutional work perspective with actor network theory (ANT). Because ANT is specifically concerned with the development of coalitions, it is a useful lens through which to view the institutional work practices associated with forging an actor network toward the diffusion of a network innovation. ANT notes not only the heterogeneity of motivations in actors mobilized toward a common cause, but also that these actors may be non-human actants (Callon 1987). For example, in Latour's (1993) account of how pasteurization practices diffused, he attributes agency to actants as diverse as Louis Pasteur, battlefield medics, and germs. I therefore find this lens useful in understanding the practices entailed in forging an actant network toward the diffusion of network innovations.

3.2. Methods

In the following sections, I provide an overview of my methods and describe my investigative venue. I briefly describe the data collected and the underlying phenomenon of the Metaverse Church.

After spending about 10 hours online, I developed an interview protocol to help me understand how different Metaverse Church participants fostered diffusion and managed their identities. This protocol is in Appendix A. I then applied to the OU IRB (University of Oklahoma Institutional Review Board) for permission to conduct my study. My main approach to collecting and analyzing my data was netnography.

3.2.1. Netnography

A variation on ethnography, netnography is an approach "to conducting ethical and thorough ethnographic research that combines archival and online communications work, participation and observation, with new forms of digital and network data collection, analysis and research representation" (Kozinets 2006, p. 1). Over a five-month period, I immersed myself in VRChat and AltspaceVR – two virtual reality platforms as I had limited VR experience. I began by experimenting with different avatars, learning how to navigate in VR, and familiarizing myself with different VR platforms and worlds. During this time, I also made acquaintances in VR who provided technical advice and helped me navigate the VR space. Because ethnographic work can capture unguarded human behaviors, the researcher must carefully consider the interests of her subjects (Leonardi 2015). The ethical conduct of this research was critically important. In addition to

obtaining approval for my study protocols from the OU IRB and ensuring informed consent was obtained for every formal interview or informal interaction, I carefully weighed what material to disclose in quotes in this manuscript. Identities of private individuals are masked using pseudonyms. Identities of public figures who consented to public disclosure of their information are referenced by name and/or their gamer ID.

Unlike other netnographic efforts that rely primarily on trace data (e.g., Massa and O'Mahony 2021), my investigation began with interviews of key informants (which were video-recorded with participant consent). I also consulted archival data sources for a deeper understanding of my focal phenomenon. Illustrative texts and images used are derived from both first-person interactions and secondary media such as YouTube videos (quote attributions are provided only for the latter). Finally, following Schultze (2000), this work is also confessional, capturing my reflections of my own Metaverse experiences.

3.3. Data Collection

I began with the VRChat platform. The primary informants here then led me to the AltspaceVR and Rec Room platforms. VRChat and AltspaceVR are two of the most popular VR environments (Carter 2021). Their two main competitors are Rec Room and Meta's Horizon Worlds (Vid010).

I spent over 50 hours from August 2022 to May 2023 experiencing different types of Metaverse worlds and trying different types of activities including avatar hunting, attending drinking parties, playing games, and attending different events. After identifying

the characteristics of activities of those communities, I decided to hone into religious services in the Metaverse as an interesting and fast-moving phenomenon. I collected data from metaverse churches because they held regular meetings that provided me with opportunities for observations of regular meetings and events with a specific purpose. Also, people were willing to share their story throughout the past few years, during which I was able to identify both organizational and individual level dynamics and processes. Most importantly for the organizational level research, I was able to observe the collective action necessary for the diffusion of network innovations.

I began this investigation when I met J@5p3r at the patio garden of VR MMO Church. Table 7 documents this and other observations. I then used a snowball sampling approach to identify subsequent informants. I invited and scheduled interviews using direct messaging (DM) on the Discord[17] platform. Table 8 documents the interviews conducted for metaverse church pastors and attendees. I also used Discord DM to solicit clarification and follow-up information from interviewees. I also viewed the podcasts and webinars noted in Table 9.

[17] Discord is a chatting forum platform where many gamers or special interest groups (dance academy, church, role playing community, etc.) and communities gather and share information or interact online. The majority of communities in the metaverse concurrently use Discord as a means for communication to send out announcements, chat, and share photos/videos.

Table 7. Participant observations

Church	Role	GamerID	Duration	Venue	Notes
VR MMO Church	Pastor	DJ Soto	10.23.2022 14 mins	VR MMO Church in VRChat	Sermon. Attended a church in the Metaverse for the first time. Joined a few minutes late due to experiencing trouble logging in. Pastor Soto started with a prayer, talked about the church's social media, went through the scripture, and then ended with a prayer. The sermon was short. Right after the sermon people gathered with Pastor Soto and talked about Jesus, and what he meant to them.
VR MMO Church	Pastor	DJ Soto	10.30.2022 67 mins	VR MMO Church in VRChat	Sermon. Second time attending church in the Metaverse. After the service four people came up to me to chat and we became friends. Conversation included attending different worlds in VRChat and advantages of full-body-tracking devices.
VR MMO Church	Pastor	Pintsizedrobot (Pastor Koko)	10.30.2022 39 mins	VR MMO Church in AltspaceVR	Sermon. Pastor Koko gave a sermon to over 25 people in AltspaceVR. The world's graphics were designed to depict each verse of the bible featured in the sermon. People were muted and they followed through Pastor Koko explaining each verse. She did not emphasize anything about the scenes made by graphic, but she made sure people were following along and were at the correct spot.
VR MMO Church	Pastor	DJ Soto	11.06.2022 41 mins	VR MMO Church in VRChat	Sermon. Pastor Soto read Mark Chapter 2. He wore a giant robot avatar saying, "I am feeling iron-giant-ish today. Hope it doesn't mess up the stream". He told people that everyone was welcome, whether or not they believed in God. He also greeted people watching the sermon on YouTube or Twitch. He promoted Discord and VRChat for ongoing interaction with the community. He also related the story about old wine in a new wineskin to being in a Metaverse Church. He exhorted people not to get discouraged by others' criticism for attending a church in the Metaverse instead of an IRL church.
VR MMO Church	Attendees	DJ Soto GhostHat*, Legacy*, BobCat*, RisingSun*	11.06.2022 74 mins	VR MMO Church in VRChat	Socializing. After the church session, Pastor Soto assembled everyone for a group photo, which GhostHat took. After the pastor left, one person said, "Pastor Soto likes taking pictures after every session." He wouldn't join the photo himself because his hair was not done, his clothes were not fancy, but maybe when he got a fancier avatar he might join. Someone nearby commented that they didn't understand why people would dress in an inappropriate outfit when coming to church even in VR. We decided to go to a special Halloween-themed Pumpkin Master world where we would collaborate to find clues to solve riddles.

Church	Role	GamerID	Duration	Venue	Notes
VR MMO Church	Attendees	ToyWoody*, ShortArms*, RobB*, JaC*, Bunny90*	11.02.2022 56 mins	Putt Putt Quest (mini golf) VRChat	Socializing. OtterMan* explained what "revealing an avatar" is and told me about how PC users' avatars may be shown to Quest users as a "fallback avatar" instead of the real avatar due to graphical incompatibility. Later, people went to play minigolf in a different world by dropping a portal inside the VR MMO Church for anyone interested to join from there. They specifically searched for a "Quest compatible" world so that the Quest-only users can mingle together.
VR MMO Church	Pastor	Bismikk	11.13.2022 12 mins	VR MMO Church in VRChat	Sermon. Quest users with lower graphics (lower-level technology) were unable to join the church session run by Pastor Bismikk. I sent a Discord DM to Pastor Soto. He said it must be a crasher, and that Pastor Bismikk's avatar should not be the problem. Others who joined with me were stuck at the church's gate. I experienced technological glitches. In 12 minutes, I had to rejoin the session 5 times, and eventually failed to join. Impossible to go past the gate, I stood in the lobby where I could hear the sermon until the end.
MetaChurch VR	Attendee	30 attendees including Erallie, ToyWoody*ShortArms*	11.13.2022 100 mins	MetaChurchVR in VRChat	Sermon. On the same day that the VR MMO Church got attacked by a crasher, I searched for my friends' gamerIDs and they appeared to be in the MetaChurchVR world. I got curious why they were there and joined that world. My friends told me that somebody recommended this new church after the crasher messed up the sermon of the day, so they decided to go there, and realized this church had a longer session with a more IRL church-like vibe. We decided to attend this church from now on.
VR MMO Church	Pastor	DJ Soto	11.20.2022 54 mins	VR MMO Church in AltspaceVR	Sermon. Attended DJ Soto's session of the AltspaceVR sermon which takes place 2 hours prior to the Sunday sermon on VRChat. The age group of the people attending this sermon seemed older than the people I met in VRChat. Pastor Soto started the sermon with a gospel, although the gospel sounded like a misture of heavy metal and rap, so not all people seemed like bouncing to the rhythm but Pastor Soto himself. The format of the world's design was very similar to what Pastor Koko's sermon looked like. Verses of the bible were written in mid-air floating everywhere, and each graphics that depicts each scene of the bible verse. Pastor Soto made full use of the graphical features by explaining the contrast between dark and light with the color contrast of the pixels and the barrenness of a dirt mountain compared to the green hill covered with vines and flowers.

Church	Role	GamerID	Duration	Venue	Notes
VR MMO Church	Attendee	J@5p3r*	12.04.2022 3 mins	VR MMO Church in VRChat	Socializing. J@5p3r said goodbye to all pastors and that he was leaving all Metaverse churches because he was discouraged with churches after revealing he was taking meds to transition (from male to female). He said Pastor Soto was the only one who did not say that he will go to hell, and thanked him for being cool, but he is leaving the church anyway. Pastor Soto was very surprised that J@5p3r had decided to leave all churches and felt bad about it.
VR MMO Church	Attendee	J@5p3r*	12.04.2022 43 mins	Soft Solace in VRChat	Socializing. J@5p3r recommended I interview trusted-rank users because they have been in the Metaverse for a long time, and they would have more to say. He also mentioned that it is so weird and frustrating how some people intentionally hurt others in VR churches.
MetaChurch VR	Pastor and attendees	Pastor Mike	11.20.2022 51 mins	MetaChurchVR in VRChat	Sermon. First time I attended a full church service of MetaChurchVR. The sermon in this church had a fixed structure. It started with a prayer by Pastor Mike. And then Pastor Mike projected two gospels on the screen up front near the stage and podium. Other attendees later told me that Erallie used to sing at least one of the gospels when she was available. Pastor Mike then read through the scripture and made a speech, and Pastor Mike played one last gospel. After the sermon, all including Pastor Mike gathered to chat.
MetaChurch VR	Attendees	10 people including ToyWoody*ShortArms*	11.20.2022 112 mins	MetaChurchVR in VRChat	Socializing. Mingled and chatted with friends after the sermon, and eventually went to a different world where people watched movie and chilled because ShortArms wanted to show me how that world worked and how cool that world is for chilling.
MetaChurch VR	Pastor and attendees	30 people including PastorMike, Sparkle42*, 9$Red*	11.27.2022 23 mins	MetaChurchVR in VRChat	Sermon. Pastor Mike followed the same format of the sermon from last week. Whenever the gospel was turned on, Sparkle42 was constantly standing up and spreading his arms open, sometimes in front of his chest, and sometimes above his head, as to solely feel the holiness of the gospel. It seemed like 9$Red always sang along, audible to everyone near him. He was not a great singer, though. ShortArms sang when he knew that gospel, which was not all of them, and ToyWoody switched onto his avatar's dancing mode when he liked the gospel that was currently playing.

Church	Role	GamerID	Duration	Venue	Notes
MetaChurch VR	Pastor and attendees	Attendees	11.27.2022 132 mins	MetaChurchVR in VRChat	Socializing. People grouped up in threes and fours in each corner of the church and started chatting and sharing their thoughts on Christianity and Jesus. Some were just hopping around listening to this group and then to the next group. Somebody wanted to have some serious talk with Pastor Mike, and asked if he even cared to listen. Pastor Mike tried hard to tell him sincerely that he cared, and that he would even spare extra time on some other days to talk with him if he wanted to.
VR MMO Church	Pastor and attendees	19 people including Pastor Bismikk	11.27.2022 18 mins	VR MMO Church in VRChat	Sermon. Attended two churches at the same time, but with a different VRChat ID for this sermon. As a result, people did not know that it was me in a different avatar. Sermon proceeded normally. Pastor Bismikk crashed after 12 minutes into the sermon, and pastor Alina who was present, took over by standing on the menu panel in front of the stage for better exposure because she was in a tiny reindeer avatar. She apologized for having to end the sermon earlier, and everything ended with taking a photo altogether. Pastor Bismikk joined again and apologized for the crash and wished everyone a good week.
VR MMO Church	Pastor and attendees	13 people including Pastor Bismikk	12.11.2022 4 mins	VR MMO Church in VRChat	Sermon. Stopped by to see if DJ Soto was preaching, but he was not there and Pastor Bismikk was preaching. So I just left to join the MetaChurchVR where my friends are at.
VR MMO Church	Pastor and attendees	16 people including Pastor Alina and Pastor Soto	12.23.2022 6 mins (excluding 45 mins figuring out how to get there)	VR MMO Church in RecRoom	Sermon. The RecRoom campus of VR MMO Church was the only venue that was open for sermon close to Christmas among the three churches of observation in the Metaverse. On Discord, VR MMO Church made an announcement that they will have a sermon on RecRoom. It was my first time even using RecRoom because I had to install the app even before I can navigate into it. I was forced to go through a tutorial even when I wanted to skip, so I initially wasted time. I went online in my computer and smartphone, did some searching on the web, and found out that "Nativity.VR @aliceinthapalace" was the address of where the VR MMO Church's sermon was taking place. 45 minutes passed by just to install and try to figure out how to get to the event. When I finally went in, the sermon was over. Graphics were Christmas-themed. Most of the people sounded like younger people and teenagers and they were very noisy, Or even out of control, everyone talking here and there, all at once. I just left due to being stressed out, and decided to never join the RecRoom session ever again.

Church	Role	GamerID	Duration	Venue	Notes
MetaChurch VR	Pastor and attendees	26 people including PastorMike	12.11.2022 35 mins	MetaChurchVR in VRChat	Sermon. Erallie told me that her friends are mostly not Christian so she cannot join the church together since they are not that interested. Pastor Mike used the gospel he usually plays. ShortArms started singing along out loud and people nearby cannot hear him singing. This was the last sermon before Christmas until the new year's day. Pastor Mike recommended that we attend Cornerstone VR Church's Christmas Eve sermon, so it seems that these two churches are close to each other.
MetaChurch VR	Pastor and attendees	8 people including Cabbage2*	12.11.2022 96 mins	MetaChurchVR in VRChat, Among Us Game World	Socializing. Cabbage2 came over the MetaChurchVR world to say hi to me after his sermon attendance at VR MMO Church. He told me that he came here today because missed me and his friends. I asked him to join the Among Us game. with MetaChurchVR friends including ToyWoody and ShortArms.
MetaChurch VR	Pastor and attendees	22 people including Pastor Mike	01.01.2023 42 mins	MetaChurchVR in VRChat	Sermon. I was going to join MetaChurchVR on time, and I realized Otterman sent me an invitation to that very church, most likely to encourage or remind me to come to church, not knowing that we are going to meet soon once my VR finishes its lag and brings me to MetaChurchVR world. ToyWoody and ShortArms saved their hands and quietly greeted me while they were listening to Pastor Mike. Pastor Mike prayed and said that he is grateful for the VR to have provided a space for us to gather. He encouraged people to join the discussion and mingle on Discord even when we are not joining the sermon. There was a crasher today, and I got kicked out from the church world instance because I did not block him and just observed his disruptive behaviors. Later, others told me that they blocked him once he started running around.
MetaChurch VR	Pastor and attendees	ToyWoody, ShortArms, GR3Ytails*, PutpleShoes*	01.01.2023 56 mins	MetaChurchVR in VRChat	Socializing. People said Happy New Year to each other. ToyWoody asked me, *"You keep on crashing in and out of here. You doing alright?*" So, I told him that I was observing the crasher. ShortArms and ToyWoody both said that there were at least two or three of them, and that they blocked them all. And then one person approached to start a conversation about how he recognized our gamertags (gamer ID or Display name) and then he started talking about whether it is possible to be in multiple religion. He said he has been hopping around in multiple religious worlds in VR, and that he thinks religions have some common grounds.

Church	Role	GamerID	Duration	Venue	Notes
Cornerstone VR Church	Pastor and attendees	23 people including Pastor Goose	12.11.2022 48 mins	Cornerstone VR Church in VRChat	Pastor Goose started the sermon, and said that this is a real sermon and is equivalent to a real church. He emphasized that sermon has three components: *Christ is preached, Lord, Messiah, and Resurrected*. He asserted that this session has all three of those, and therefore it is a genuine sermon.
Cornerstone VR Church	Pastor and attendees	23 people including Pastor Goose	12.11.2022 18 mins	Cornerstone VR Church in VRChat	Socializing. One attendee asked Pastor Goose right after the sermon, if it is appropriate that some artist that he read about recently painted his own face in the face of the soldier who crucified Jesus's body, as if he the artist himself is depicting his own image to the soldier instead of the traditional typical soldier's face. One woman taught Pastor Goose, seeing his ASL (sign language) name tag which happened to be on this avatar, how to say "amen" I the VR ASL way. Pastor Goose said thank you for sharing.
Cornerstone VR Church	Pastor and attendees	24 people including Pastor Goose	01.01.2022 40 mins	Cornerstone VR Church in VRChat	Sermon. Pastor Goose emphasized that we are family and we don't just *do church on Sundays, we do everything together on other days, so if you have not been in other events you are missing out, check out the Discord*. The worship was held by Nick Anderson, one of the seniors of Cornerstone Church, sharing his experience with glory of god. It was interesting that people here called each other by their IRL names, Not by their gamerIDs.
Cornerstone VR Church	Pastor and attendees	8+ people including Pastor Goose and UglyPJ*, bnfsmf, and BudHeavy	01.01.2022 46 mins (before sermon: 14 mins, after sermon: 32 mins)	Cornerstone VR Church in VRChat and Ghost world	Socializing. UglyPJ came up to me, said hi, and continued to tell me that he opened up his own ministry world in VRChat because he really got tired of how other church worlds are run, and that it was time for him to make his own. Pastor Goose suggested that people who are available join the game called Ghost with him, saying that it is a rare opportunity to *kill him* (with a gun in the game). A total of 8 of us from Cornerstone VR Church went to the Ghost world in a private instance so that only we can play together without having strangers joining the gaming session. People were excited to kill Pastor Goose, but Pastor Goose was very good at playing the game.

*Pseudonym

Table 8. Interviews of metaverse church members

Church	Participant GamerID	Role	Notes	Interview Duration	Interview Venue
VR MMO Church	J@5p3r*	Attendee	Individual user met at VR MMO Church Patio map	98 mins	Soft Solace
VR MMO Church	ToyWoody*	Attendee	Individual user met at VR MMO Church	65 mins	Udon Bird Sanctuary
MetaChurchVR	IceSquirrel*	Attendee	Individual user met at MetaChurchVR	85 mins	Outer Space Obelisk v1.26
Cornerstone VR Church	OldJeans*	Attendee	Individual user and Jewish Rabbi met at Cornerstone VR Church	127 mins	Cornerstone VR Church
VR MMO Church	DJ Soto	Bishop/ Pastor	Lead Pastor and Founder of VR MMO Church	36 mins	VR MMO Church Park
VR MMO Church	DJ Soto	Bishop/ Pastor	Lead Pastor and Founder of VR MMO Church	15 mins	VR MMO Church
VR MMO Church	pintsizedrobot	Pastor	Pastor Koko of VR MMO Church	85 mins	VR MMO Church
MetaChurchVR	Pastor_Mike	Pastor	Lead Pastor and Founder of MetaChurchVR	89 mins	MetaChurch VR
Cornerstone VR Church	Goose316	Pastor/ Missionary	Pastor Goose of Cornerstone VR Church	115 mins	Personal World, (new) Cornerstone VR Church

*Pseudonym

Table 9. Podcasts and webinars

No.	Church	Medium	Host	Length	Link
Vid001	VR MMO Church	Youtube Podcast	VR MMO Church	00:54:00	The Future of the Church is the Metaverse Podcast S1 Ep1 https://www.youtube.com/watch?v=35fzuSt8xm4
Vid002	VR MMO Church	Youtube Podcast	VR MMO Church	00:54:29	The Future of the Church is the Metaverse Podcast S1 Ep2 https://www.youtube.com/watch?v=lIoGhsIJtgI
Vid003	VR MMO Church	Youtube Podcast	VR MMO Church	00:54:13	The Future of the Church is the Metaverse Podcast S1 Ep3

No.	Church	Medium	Host	Length	Link
					https://www.youtube.com/watch?v=HQ76xSuumO8
Vid004	VR MMO Church	Youtube Podcast	VR MMO Church	00:58:20	Heavy Metal Pastor (Episode 4 of the VR MMO Church Podcast) S1 Ep4 https://www.youtube.com/watch?v=S1Pe5Rlipi4&t=250s
Vid005	VR MMO Church	YouTube	Syrmor	00:10:54	Real Pastor in Virtual Reality Baptizes an Anime Girl https://www.youtube.com/watch?v=N_88DBmdnNA
Vid006	VR MMO Church	YouTube	VR MMO Church	00:47:42	VRChurch in Altspace - Americas / Mark Chapter 3 https://www.youtube.com/watch?v=Jx6n18fbJVE
Vid007	VR MMO Church	YouTube	VR MMO Church	00:54:26	VR Church in AltspaceVR / Matthew 13 / Pastor Koko https://www.youtube.com/watch?v=y1Xh6oWxdDs
Vid008	VR MMO Church	Youtube Podcast	twelve:thirty media	01:13:11	EPISODE 380: Church in Virtual Reality with DJ Soto https://www.youtube.com/watch?v=ncN9CG1I1_Y&t=275s
Vid009	VR MMO Church	Youtube	BBC World Service	00:05:20	The church that isn't closing its doors - BBC World Service https://www.youtube.com/watch?v=HZXn41SJORs&t=118s
Vid010	VR MMO Church, Cornerstone VR Church	YouTube Webinar	VR MMO Church	02:42:10	How to Launch a Metaverse Church in 3 Days https://www.youtube.com/watch?v=76BQhk_h3nw
Vid011	Cornerstone VR Church	YouTube	Official Cicada Network	00:05:18	VRChat World review. Cornerstone church https://www.youtube.com/watch?v=u7o6Ntq7XsA
Vid012	Cornerstone VR Church	YouTube	NBC The Today Show	00:05:37	How The Metaverse Is Changing the Way People Attend Church https://www.youtube.com/watch?v=kAgDhYktLqg
Vid013	Cornerstone VR Church	YouTube	TheChurch.Digital	01:00:59	Virtual Reality Worldbuilding with Michael Uzdavines https://www.youtube.com/watch?v=v5lD-MKze1Q
Vid014	Cornerstone VR Church	Vimeo	City Rev Church	00:41:02	12-29-19 “Who is in Charge?” by Pastor Michael Uzdavines https://vimeo.com/381917936
Vid015	Cornerstone VR Church	Apple Podcast	Stu on This	00:47:00	Michael Uzdavines: A Lawyer, a pastor, and a gamer walk into Virtual Reality

No.	Church	Medium	Host	Length	Link
					https://podcasts.apple.com/us/podcast/021-michael-uzdavines-a-lawyer-a-pastor-and/id1474856345?i=1000559465298
Vid016	Cornerstone VR Churchs	Podcast (leadnet)	Leadership Network Podcast	00:58:39	LNP1 – Metaverse 101: Discovering the Next Great Mission Field Leadership Network Podcast | Episode 1 Https://Leadnet.Org/Lnp1-Metaverse-101-Discovering-The-Next-Great-Mission-Field/

3.4. Findings

Below, I first briefly describe the phenomenon and the cast of characters. I then discuss the institutional work practices through which the network of actors was forged.

3.4.1. The Phenomenon: Religion in the Metaverse

Religion is one of five core societal institutions, along with markets, bureaucracies, families, and democracies (Friedland and Alford 1991). "IT researchers have yet to ask how institutions influence the design, use, and consequences of technologies … how regulative processes, normative systems, and cultural frameworks shape the design and use of technical systems" (Orlikowski and Barley 2001, p. 153). One especially understudied institution is religion.

Participation in organized religion, especially for people under 30 years old, is on the decline in the United States according to several recent studies (Casey and Remington 2022). Reasons for this decline include clergy abuse of people and of authority; financial misconduct; and alignment of white Christianity with conservative politics and fake news. Rabbi Rachel Gartner described how young people feel about attending religious services today:

> "*I don't want to participate unless I can show up authentically – as who I am, politically, in terms of sexual orientation, gender identification, racially, ethnically, in the body that I am, with its limits and its potential and its abilities*" (Casey and Remington 2022).

As a consequence, Christianity in the US is approaching crisis. As Pastor Koko noted,

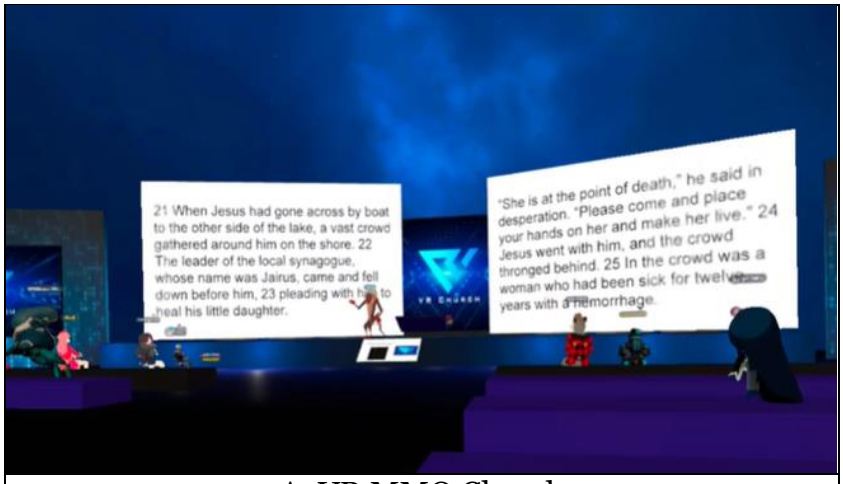
> "*Statistics on Bible engagement have plummeted… because there is so little Bible engagement in American… we are one generation away from a heretical schism in the church because people don't know what the Bible says because they are not reading it… We are confusing traditional methods with mission*" (Vid003).

Against this backdrop, there has been an increase in Christian evangelicalism, in general (Casey and Remington 2022). Metaverse churches, especially, are growing. An August 2022 news report estimated a 500% growth of Metaverse churches in the prior six months (Sellers 2022). These churches offer all the services that conventional churches do, including baptism and communion (Sellers 2022). From the perspective of Church administrators, Metaverse churches are more cost effective, not incurring the real estate and utility costs of brick-and-mortar churches. From the perspective of attendees, Metaverse churches offer flexibility and an extended array of choices. Pastors need not be co-located with their churches. For example, Pastor Goose, who conducts services for California's Cornerstone VR Church in the Metaverse, lives in Florida. The look-and-feel of Metaverse church services is similarly unconstrained by offline realities.

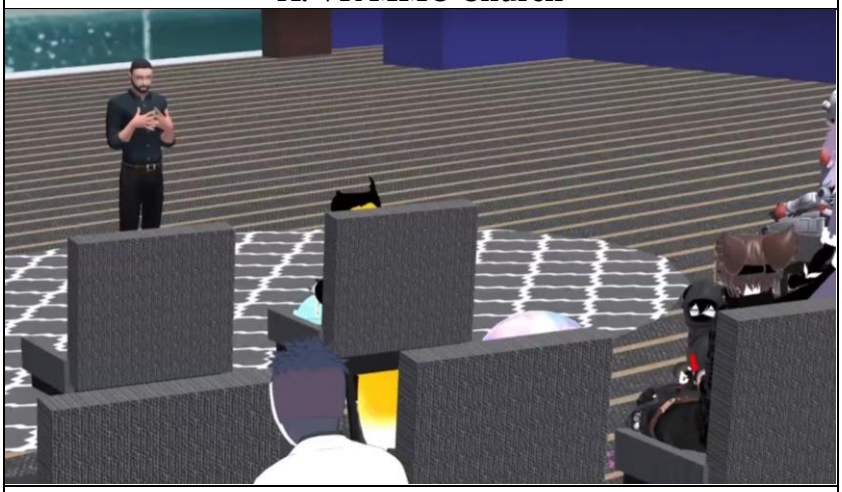
> "*The beauty of the Metaverse is you can design it however you like – no worldly limitations…. You can do church outside … it never rains*" (Sellers 2022).

Nonetheless, church designs in the Metaverse parallel those of traditional churches to varying degrees. Metaverse churches typically have a "stage" that separates the ministers from their congregations. While the stage usually appears at the front of an auditorium-type layout, it may also be at the center of a stadium-type layout. Pastors conducting services speak from this stage area, while congregants typically stay off the stage. Congregant spaces appear visually similar to the pews and seats of IRL churches. Figure 22 depicts the layouts of the three churches studied.

Figure 22. Metaverse church interior layouts



A: VR MMO Church



B: Cornerstone VR Church



C: MetaChurchVR

Not all Metaverse Churches have an IRL counterpart. When they do, isomorphic designs can contribute to a church's branding. For example, in Figure 23, I see the Cornerstone VR Church was built to look just like the IRL Yuba City campus, to its stained glass windows (Sellers 2022). Churches operating across platforms also evince similar designs to promote recognizability.

Figure 23. Correspondence between IRL and metaverse design of Cornerstone Church

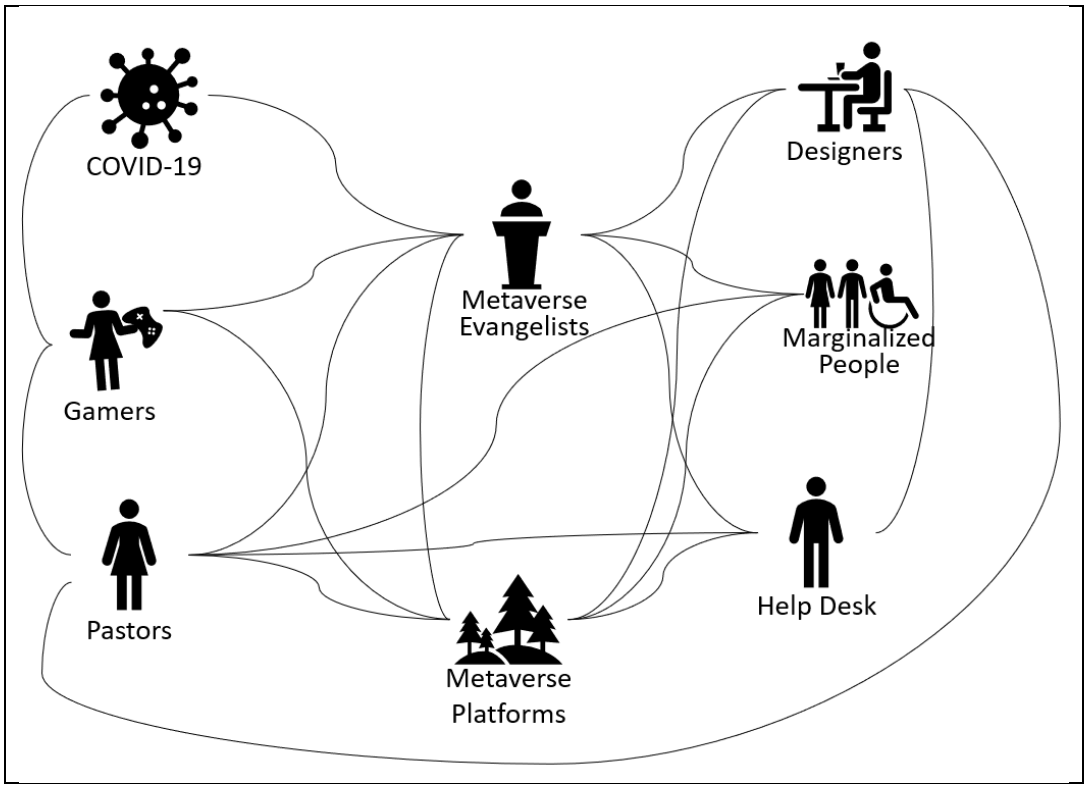


Identities in the Metaverse are somewhat fluid. Some actors, e.g., Pastor Soto, maintain a Metaverse presence – avatar and gamer ID – consistent with his IRL self. Others, e.g., Pastor Mike, strive to present the best version of himself online, consciously creating his Pastor_Mike avatar to be more "buff" than his IRL self (interview). For others, e.g., Aleatha Singleton's Pastor Koko and Michael Uzdavines's Pastor Goose personas, the correspondence loosens further to non-human figures.

3.4.2. The Cast of Characters

Figure 24 summarizes the actants within the emergent network that is institutionalizing the non-denominational church in the Metaverse. Similar to the germs in Latour's (1993) historical account of Pasteurization, Covid-19 played a key role in forging the emergent actor network. The agency of Covid-19 played through in its initial onslaught and subsequent waves, driving actors under lockdown to seek other modes of relating and experiencing community.

Figure 24. The Actor Network for the metaverse church



At network center are the evangelists for the Metaverse Church. A key evangelist revealed by my data was Pastor Soto. Pastor Soto, 44 years old, founded the VR MMO

Church, where he serves as bishop and lead pastor (Soto 2022a). He obtained a Bachelor's Degree in Bible Studies from Pensacola Christian College, a Baptist school in Florida, in 2000 (Soto 2022b). Feeling alienated by the conservatism and exclusivity of the church, he worked as a high school computer and music teacher and a photojournalist for small television stations upon graduation (French 2018; Soto 2022a). He was drawn back to pastoring after covering a youth group at a Pentacostal megachurch. Pastor Soto believed Christianity had abandoned its key constituents. His mission was "to create a radically inclusive church", one that reached out to "the weirdos, the sinners, the damned, the indisposed" (French 2018). Initially, he pursued this mission via pop-up churches on backroads between Pennsylvania and California. He also had been live streaming services to permit the elderly, sick, and disabled to attend. But ultimately, he saw the possibilities for inclusiveness in the digital world. He began by hosting services in AltspaceVR in 2016, occasionally preaching to dozens of attendees and occasionally to an empty virtual room. The church has since acquired six additional staff pastors including his wife Pastor Kari, and has an international audience of about 200 members, half in Europe. Pastor Soto was interviewed for the Today Show in 2018 (Kelly 2018). His YouTube channel has over 1,000 subscribers. His 2-hour, 42-minute YouTube video entitled "How to Launch a Metaverse Church in 3 Days" had 1,600 views.

Another pastor evangelizing the Metaverse has been Pastor Jaypo (Jason Poling, or Pastor Jason) of the Cornerstone Church. He was interviewed for the Today Show in 2022 (Sellers 2022). Pastor Jaypo obtained a Bachelor's in Organizational

Communication from Cedarville University in 1997 (Poling 2022). Upon graduation, he worked for a high-tech manufacturing firm and served in volunteer and part-time ministry roles. He returned to school for a Master of Divinity from the Southern Baptist Theological Seminary in 2005, and an MA in Biblical Counseling from Faith Bible Seminary in 2015 (Poling 2022). Following completion of these degrees, he has served consistently in ministry roles in Iowa and California (Cornerstone Church 2022). In 2018 at the age of 43, he answered his calling to be lead pastor at Cornerstone Church of Yuba City in California. Cornerstone Church has three campuses and teams – one is the physical Yuba City campus and two are the Metaverse (VRChat and AltspaceVR) digital campuses. There are 15 people in the operations team for the Yuba City physical campus and four on the digital campuses. Pastor Jaypo leads both teams. He is on social media platforms Twitch, TikTok, and Facebook.

The pastor evangelists also work with others within their own churches, with each other, and ministers of other Metaverse churches being founded. They are thus directly networked with these actors. Examples of these are Pastors Koko and Goose. Pastor Koko is an elder and a pastor for both their VR and MMO churches (Vid003). She describes her early experience as growing up in a "*small-town legalistic church culture*" in the 1980s. Being female, she never imagined becoming a pastor, because in that culture, "*women were to be silent… we could teach kids, but that's about it – we couldn't be a pastor… Women were only allowed to do children's ministry… not lead worship*." Pastor Koko "*got into [VR] because of my career as I actually design for XR*

and I teach other people how to design for XR" (Vid010). She is the pastor for Final Fantasy XIV, which is on the MMO church side of their operations.

Pastor Goose, a 45-year-old, built and runs the Cornerstone Church VR campuses. Following a 15-year career as an attorney, he experienced a calling and got his Masters in Divinity from Liberty University. After serving as a pastor for a megachurch, he moved to Cornerstone VR Church in 2020. A versatile individual, Pastor Goose has been running his own video game development and consulting company for the past 10 years. He has built three churches in VR space and serves as a virtual CFO for churches. Ongoing projects include developing multiplayer and single player video games, AI coding, and recently a standalone church app. He does not do 3D art and has been sourcing that from fiverr.com (a freelance services global online marketplace) for the past 5 years.

The pastor evangelists also are indirectly networked with ministers of other Metaverse churches via shared congregants. One such minister is Pastor Mike. Though only 21 years old, Pastor Mike is the founder and lead pastor for MetaChurchVR. Pastor Mike is finishing his Associates Degree in Biblical Studies at Calvary Chapel Bible College, an evangelical Christian school. He grew up as a Catholic but, feeling the need for more codification and enforcement, converted to non-denominational Christianity. He started using VR in 2016 for gaming and VRChat in 2017. He differentiates his ministry Pastor_Mike avatar from his gaming avatar, a Master Chief soldier from the game Halo. In other games he would go by the gamerID including the name "Optimus Prime" which

is his favorite character. When not in church, he consistently uses his Master Chief gaming avatar. He narrated his calling to start a VR Church thus:

> *"I was having a dream one night. I heard people talking to me and calling me 'pastor'… And I was like, 'That's kind of weird.' I never really thought about becoming a pastor when I first got saved because I was, you know, kind of on fire for God. I was like, hey, I want to, you know, I want to give my whole life to God and I want to do all this stuff. But I was like, 'oh, my gosh, that's a lot of responsibility. You need a lot of education. You got to get things right.' But then I was like, 'Oh, maybe I'll be a missionary and go out and tell people the gospel or evangelize.' … I thought … I know how to do this. And I … knew I wouldn't regret it. And even now, six months in, I'm like, I know this was the right decision. … Yeah, I just went headfirst into it… Totally an act of God."* (Interview)

Two days after the dream, Pastor Mike went onto fiverr.com and outsourced the design of a VRChat church for $300. He aimed to be one of the first churches in the Metaverse. Within the week, MetachurchVR was online.

Most participants in Metaverse church services – pastors and church attendees – are gamers. An avid gamer, Pastor Soto's LinkedIn profile also notes his role as Commander of Rescue Squad One in Star Citizen (Soto 2022a). He also plays Final Fantasy XIV, an online PC-based game. Gaming and technology were Pastor Koko's tickets out of a world that restricted women from the ministry. Pastor Soto recognized Pastor Koko's potential for spiritual leadership from her leading Final Fantasy XIV online sermons (Vid003). She, along with Pastor Soto, are the White Mage class – a healer class – in Final Fantasy XIV.

Most participants in Metaverse churches are experiencing alienation in some form. Pastor JayPo said, "*People come there to try to deal with some of the issues they are facing*" (Sellers 2022). Some are alienated from existing church communities because of Covid-19. Others are alienated by gender identity and sexuality issues. For example, I previously noted Pastor Koko's experience of being precluded from leadership roles in her church (Vid010). J@5p3r was transitioning from male to female and sought acceptance unable to be experienced in conventional churches. Still others are alienated by illness and disease. Many of these begin attending services online and then go onto to leading services in the Metaverse (Sellers 2022). Formerly a flight attendant, Pastor Alina developed a debilitating disease that rendered her housebound (Vid010). She found freedom from her physical constraints in VR and community in the VR MMO Church. She now conducts the Church's services in AltspaceVR.

Another set of actors in the Metaverse churches are technical people who serve as world/ event designers and help desk personnel in the Metaverse. For example, Pastor Koko works from home doing web design and digital graphics, and teaches classes on web design and digital graphics in-person and via Zoom. Another such person is Cheddars, who described himself thus:

> "*I'm just a friendly volunteer at VR MMO Church and Cornerstone [VR] Church trying to help churches get started*" (Vid010).

At network center are also the Metaverse platforms being co-opted by various actors towards establishing religious communities online. These include Metaverse platforms of VRChat, AltspaceVR, Rec Room, Horizons World, and Sominium/Decentraland. Since most players are also gamers, they are intimately familiar with the disparate

cultural contexts of VRChat versus AltspaceVR and the technical strengths and limitations of these and other platforms. As noted earlier, some attempt to broaden their ecclesiastical reach by co-opting multiple platforms.

3.4.3. Institutional Work Practices

Based on Emirbayer and Mische's (1998) conceptualization of agency, Lawrence et al. (2011) identified three types of work practices: projective agency, managing exigencies, and developing habits. I now look at how performance of these practices contributed to forging the actor network (see Figure 24).

3.4.3.1. Projective Agency

Projective agency refers to "future-oriented intentionality, focused on consciously and strategically reshaping social situations" (Lawrence et al. 2011, p. 53). Below, I identify two projective agency practices through which the emergent network forged their ties with one another to promote diffusion of the Metaverse Church.

Conscripting a Non-Human Actant as Foe: Already conducting AltspaceVR services in 2016, Pastor Soto was an early adopter of the Metaverse for digital religion. When interviewed for the Today Show in 2018 though, he was told that the Church would not support his vision for the Metaverse (Kelly 2018). Many challenged his belief in the viability of the Metaverse Church (Interview). Nonetheless, he not only persisted, but continued to advocate for the Metaverse.

Environmental shocks offer moments of liminality during which existing meanings are suspended and open to challenge (Howard-Grenville et al. 2011). The Covid-19 pandemic was such an exogenous shock. As congregations under lockdown were precluded from traditional services, religious institutions accelerated their adoption of digital technologies, finding new ways of reaching their congregations. Religious leaders of all types began live streaming services. Streaming into congregants' homes did not satisfy the community function of churches though, leaving congregants feeling isolated. Gamers therefore started to look for VR services to fulfill their community needs. One such gamer, who later became Pastor Koko, noted:

> "*One time during the COVID lockdowns I was wondering … if there's a VR Church. And so, I Googled VR Church way back then and oh there is something called VR Church*" (Vid003).

Pastor Soto and others took advantage of the liminal moment created by Covid-19 - the ambiguity of whether people could reconvene church gatherings in person or not - to promote his vision for religion in the Metaverse. By conscripting the Covid-19 virus into an actor network for the Metaverse Church, they provided prior opponents with an antagonist around which everyone could now rally[18]. Uniting against a common enemy has long been a popular collective action strategy, operating through collective identification pathways (Klandermans and De Weerd 2000; Sturmer and Simon 2004).

[18] In this case, Covid-19 acted as an event during the period between 2020 and 2022, causing metaverse churches to become more active and increasing the chances of an influx of participants. However, we see Covid-19 as one of the types of non-human actants that could potentially exist to accelerate church activities in the metaverse.

Envisioning the Metaverse as Inevitable: Relatedly, Pastor Soto presented the Church in the Metaverse as an inevitable development. He also painted resisters as stodgy and probably unable to keep up with their younger congregants' needs.

> *"The pandemic has catapulted the church into forward-thinking Ministry. Ten years ago, churches were wondering whether they should have a YouTube page. Now almost every Church on the planet is live streaming via YouTube. The church is once again at the precipice of a new technological wave called blockchain. Blockchain is the underlying technology for Bitcoin, Ethereum and all other forms of digital currency. Millennials and Gen Z are adopting blockchain tech for everyday life from investing buying real estate and even receiving payments for services…"* (Vid003).

In his "how to" video, he contrasted the four "computing paradigms" he had experienced (see Figure 25). He also discussed use and maturing of digital technologies for Metaverse churches in terms of Rogers' diffusion of innovations model (Rogers 2010). In doing so, he represented the Metaverse Church as inevitable – and that other religious leaders would either be early or late in their adoption of the Metaverse.

Figure 25. Pastor DJ Soto's experienced "computing paradigms"



Not content to express his own enthusiasm for the technology, Pastor Soto also elicited and highlighted other actors' similar visions of the Metaverse Church. In his "how to" video, he called upon Pastor Koko, someone with deep tech credentials. She contributed further to the sense of inevitability of the Metaverse Church by referencing the sequence of technologies with which she had worked and describing early adopters as "forward-thinking":

> "*Professionally, I design for VR. I'm a UX designer with over 24 years of experience designing for different platforms – desktop, mobile, multimedia CDs, … those kiosks… I got into VR in 2016/2017… I've always been a future-tech-oriented person. I've always been pushing future tech anywhere I've ever worked… Back then, I was at a different church and the pastor was also forward-thinking and he had me looking at Second Life back in early 2000s. So, I've always been thinking about how the Church can minister to people and reach people…*" (Vid010).

By not only expressing his own view of the Metaverse Church as inevitable, but also eliciting similar views of tech workers, Pastor Soto augmented the emergent network around the Metaverse. By doing so, he furthered Metaverse diffusion by casting its adoption as forward-thinking – and therefore socially desirable – and concomitantly its rejection as socially undesirable.

3.4.3.2. Managing Exigencies

Institutional work oriented toward managing exigencies entails agency focused on solving the practical problems at hand (Lawrence et al. 2011). Below, I identify one such practice.

Practicing Socio-technical Inclusiveness: Lead pastors view the Metaverse as an opportunity and locale for missionary work. In the Metaverse, they are able to reach out to underserved populations, who would not attend a physical church. For example, Pastor Jaypo said:

> "*I want to help people who are hurting… The beauty of it is [people] just go onto the application … just to hang out. And they see in the event – oh, there's a church. And where they probably wouldn't come to a brick-and-mortar church, which may be awkward for them, they are like - 'I can click in – and click out if it's weird'*" (Vid010).

Expressing similar sentiments, Pastor Goose noted,

> *"We are a mission. We are a church… We are a church where we have a campus, and we do church services and all of that. But we are very much missionaries. So, in my role at Cornerstone, I fall under both Pastor Jason as a pastor, and I fall under the Mission Board as a missionary. So, I am officially a missionary of Cornerstone in the Metaverse"* (Interview)

Similarly, Pastor Mike said,

> *"What excites me about writing this world is that most of the people I meet … either can't go to church because it's too far away or they don't have a good church near them or they had a bad church experience."* (Interview)

This missionary posture requires pastors to be receptive to people of different types. This is captured in the following quote from Pastor Goose:

> *"And that VRChat, it is very much a mission field. But what's amazing about it as a mission field is … Satan always overplays his hand… And so, what has he done? First of all, he's used the Internet for just some of the most awful things and some really, you know, we get some really great things out of it. But Satan's twisted the Internet into a place where a lot of darkness can flourish. VRChat is one of those things, and we see that. I mean, it's just this … breeding ground of opportunity for people to engage in very dark things that are unhealthy for them… [Satan] has … taken people that are spread out across the globe who are hurting and need Jesus, and he has piled them, or at least all the ones that are on VR headsets into one place for us. I don't have to go to Papua New Guinea and the Congo and Argentina, Barcelona and Cleveland… There are people in all of those places who need you and they all come right here"* (Interview).

This receptivity resonated with participants. As noted earlier, many Metaverse Church participants were there because they felt alienated from traditional services. Some were alienated by virtue of their physical (dis)abilities. For example, Pastor Alina was a flight attendant until she developed erythromelalgia – a chronic illness that rendered her housebound. After twelve years, she discovered the Metaverse Church. Below is an excerpt narrating her experience:

> *"I was cut off from everything, cut off from life – no more work, no more play, no more socializing, no more church, no more meaning. The days just blurred together – TV, sleep… I thought, this is it – there is no cure for me. This is the rest of my life – until I put on a virtual reality headset and walked into Altspace and discovered virtual reality church"* (Vid010).

In another example, while demonstrating how he had baptized a girl in a wheelchair (see Figure 26), Pastor Soto remarked on the inclusivity of VR Church relative to physical churches.

Figure 26. Demonstration of Pastor DJ Soto having baptized a girl in a wheelchair



> "*One gal who goes to VR Church comes because she is in a wheelchair. So she puts on her Oculus headset… She tried to go to [church in] the physical world, and one church was like, 'You're in a wheelchair because you don't have enough faith.' And I was like that was uttered by someone on Earth? Someone actually thought those words and spoke it to you? …*
>
> *"Another guy was a heroin addict. He just got out of a halfway house and went to a local church. They kicked him out. He was not causing problems – he just looked like a recovering addict. I think Jesus would be freaking out because the church is supposed to be a place of healing and hope and a spiritual hospital"* (Vid005).

Others experienced alienation because of their gender. Earlier, I noted the sexism experienced by some, for example, Pastor Koko. Responding to such concerns, Pastor Soto said:

> *"A woman can be a pastor. She can be at the highest levels of the church. She can do everything a man can do. Whereas some of her counterparts would say, women can only do this, teach children. Pastor Alina would be a good example. In my absence, she is just as much a bishop than I am"* (Interview).

In a podcast, he defended Pastor Alina, when she had hate directed at her:

> *"When Pastor Alina was preaching, [someone] came up and started calling her Jezebel – like women shouldn't be preachers… I mean so there [were] some attitudes… that weren't appropriate. Pastor Alina sets a great example for us"* (Vid003).

But such inclusiveness was not universal. For example, Pastor Goose said,

> "*I've got three daughters and I don't like anybody telling me they can't be anything, including pastor. To me I'm like, 'No, my daughters can be anything they want to be.' But then I have to get past myself and say, okay, you know what? I'm not on the throne. I'm not the Creator … and just maybe God knows better than I do"* (Interview).

Here, I see Pastor Goose carefully distance himself from the exclusive practice by deferring to the authority of a greater power. In doing so, he communicated his sympathy with the wish for women to be treated as equals, thereby tempering their exclusion from the ministry.

Further, as noted earlier, churches in general are struggling with diminishing participation, deriving from congregants' sense that they could not show up as their authentic self. This concern for authenticity was a repeated theme within the emergent network. Encouraging authenticity, Jate Earhart of TheDigitalChurch said:

> "*If I was to use a different avatar than my actual skin color, you know how disrespectful is that… the Bible says that man looks at the outward appearance, but God looks at the heart, I just try to do that… Whoever I'm talking to … that's a person and … does it matter if this person says, 'I'm in a wheelchair' or not? It's just the person I need to know*" (Vid010).

He went on to describe the way in which the Metaverse promotes people to come as their authentic self:

> "*I have a lot better chance of getting to know this person online mostly because this person has no real reason to lie… People lie all the time in a church setting. If you're sitting in pews talking to somebody and you say, 'how are you doing?', there's a lot more at stake if I'm vulnerable in that situation than if I just say, 'I'm doing fine, how are you doing?' But if I'm online, I might say, 'you know, I'm not doing well; I'm actually kind of depressed.' And I'm being honest with you because I know that I can just leave and you never have to talk to me again. If you respond in a weird way, I mute you and I never see you again*" (Vid010).

Similarly, Pastor Soto opined that "*the anonymity of the avatar leads to deep authenticity*" (Vid010). Yet, church leaders are mindful of the illicit activities associated with the Metaverse. Rather than seeing this as a limiting factor for the presence of organized religion in the Metaverse, Pastor Soto viewed this as an opportunity, noting:

> "*If VRChat is a dark place, why is VRChurch there? We want to be a light in darkness*" (Vid010).

In this way, Pastor Soto is working to de-stigmatize those with a stigmatized identity in the Metaverse. For example, I observed Pastor Soto interacting with J@5p3r, who was distraught about other pastors' reactions to his news that he was transitioning. J@5p3r noted that other pastors had said "*I was going to hell*", to which Pastor Soto replied,

> "*We're not into that. We don't have that hell list… You're always welcome. Anytime.*" (Observation).

Another congregant, IceSquirrel[19], reported:

> *"Someone asked DJ Soto what he thinks of polyamory and DJ Soto said, if that's what you think is right for you, then that's alright"* (Interview).

Others likewise sought to diminish the salience of differences by tailoring their avatar to the audiences they wished to reach. For example, *Pastor_Mike* said:

> *"I'm better to reach people that way, being kind of similar to them in some instances. Like if I am wearing the Halo avatar,* some *people have the same interests and I'm able to connect on a relational level and it helps me spread the gospel even easier because I'm starting a relationship with somebody. If I went to an environment with … furries, for example, my friend gave me a furry avatar that's modest for the most part. I mean, it has clothes and things like that, so I'm not too worried about that. But sometimes that helps people, you know, come close our relationship and I'm able to reach them even more doing that… In First Corinthians chapter nine, starting in verse 19… Christ said, I have made myself a servant to all that I might win more of them. To the Jews I became as a Jew in order to win Jews. To those under the law, … I become like them and to those outside the law, I became as one outside the law… And to the weak, I became weak that I might win the weak"* (Interview).

Equipment costs can enact digital barriers to participation and experience in the Metaverse (Marabelli and Newell 2022). Metaverse evangelists were sensitive to the accessibility of different platforms, noting access limitations based on the VR equipment necessary for participation. These leaders moved fluidly across Web 2.0 and 3.0 platforms. Pastor Soto noted that most churches launched first in AltSpaceVR because it has video playback, enabling them to "*connect the Web2 experience with Web3… [because] there is a 2D mode*" (Vid010). But they also noted that VRChat provides the "*most immersive Metaverse experience*", has a sophisticated avatar system, and is a

[19] pseudonym

"*heavily-populated*" platform. To optimize their congregants' experience, VR MMO Church has extended to platforms beyond VRChat, including Rec Room, Horizon Worlds, and Sominium/Decentraland. Pastor Soto opined that Rec Room is "*the most fun Metaverse platform*", innovative, and accessible via all devices – VR, console, and mobile, but that its avatar system catered to a younger audience (Vid010). He also noted that "*VRChat really only works well if your PC VR – like your headset – is connected to a powerful PC. But Horizons World, you can be untethered*" (Vid010).

A final exigency noted concerned trolls, which were considered especially problematic on the VRChat platform. As his pastors expressed concerns with managing the disruptions that ensued from such trolls, Pastor Soto expressed his desire for inclusiveness in two ways:

> "*Sometimes people would come up on the stage and, at first, we would start to kick them but then we realized that people were just trying to figure out how to use their virtual reality so they would accidentally teleport on the stage. And so, I would say, okay security team, just give them a second to see if they back up. And sure enough more often than not you see them slowly like back up in the space*" (Vid010).
>
> "*If somebody is being hateful or divisive, no matter what the topic – it could be about pizza. Then we would have to have a conversation about, 'Hey, do you really want to be here? Because our vibe, our effects of this community, is it hateful and divisive?' It's less about the content because someone else could come in with the very same topic and … be nice about it. Conversation will be open minded. And so that would be welcome… Even if it's not the orthodoxy. Let's have those conversations"* (Interview).

In both instances, I see the pastor's efforts to preserve the dignity of all, even of bumblers and dissenters. I see their attempts to preserve inclusiveness in the emerging community as long as those included were not disruptive.

Each of the exigencies describe above posed problems for the legitimacy and operation of the Metaverse Church. Each is related to inclusiveness, which was a central value for evangelists for the Metaverse Church. By extending their inclusiveness, Metaverse evangelists and other actors in the fledgling network cemented their ties with those that had experienced alienation.

3.4.3.3. Developing Habits

The final set of institutional work practices I observed were oriented around developing habits, i.e., "tacit and taken-for-granted schemas of action" that have already been developed (Emirbayer and Mische 1998, p. 975). Below, I describe two such practices.

Building Community: Cultivating a sense of community was of paramount importance to the Metaverse evangelists. Consider, for example, Pastor Soto's caution to other pastors:

> "*You're not just coming here to push out an experience. You're here to connect with people and that's going to win over any over every time. By trying to focus on some grand experience now we do have the great experience, but it's not at the sacrifice of connection and cultivating community*" (Vid010).

Similarly, Pastor Jaypo noted:

> "*Mega churches are great – a lot of good things have come from mega churches. But I think we're in the Meta church movement now where maybe a lot of small churches can really feel like – oh, I can do this because we realize that we're never going to have the huge numbers. And so, we just are more wired and geared towards that really small ministry*" (Vid010).

And Pastor Mike said,

> *"I think this is a whole big experimental Christian mingle dating app … where people can find fellow Christians in VRChat. And what's been happening is that people have been saying, you know, even having discussions, talking about their life, what they're going through, people being able to get prayed for and helped. And mostly it's relationships that are being made under the foundation of the same beliefs and same ideas. And everybody's able to kind of relate on that level and maybe, you know, gather a new Christian friend group that maybe they didn't have before or never knew existed before… And that's what this whole relational step is here, is to have that relationship with one another"* (Interview).

The Metaverse evangelists and others especially linked Metaverse affordances to this sense of community. For example, Pastor Soto noted that

> "*MMOs do the best at cultivating community because they have to because the systems and the mechanisms of the game are centered around grouping up and so if we're going to group up we need these tools in game to make it easy for you to group up whether it's a guild whether it's a fellowship, perhaps it's a link shell. … I think there is something definitely to be learned*" (Vid003).

He also observed that VR is:

> *"not like Zoom … where it's all cacophonous. It's so immersive it was mind-blowing*" (Vid010).

Cheddars, the technical help volunteer for VR MMO Church and Cornerstone VR Church, noted:

> *"When COVID-19 started, we had a prayer team and I realized – wait there's spatial audio. We can have five people praying at the same time and you can still understand who's talking and who's saying what because you can … tune in to one person over there because of the spatial audio or tune into the other person*" (Vid010).

Pastor Jaypo said,

> "*Some of the anonymity that is initially there allows people to be more open about their life. It is amazing how quickly somebody will go deep with me about their life – within five minutes from meeting me*" (Sellers 2022).

Similarly, Jate Earhart said,

> "*the best and worst thing about online is that it's anonymous… it means that people can just be themselves they say what they mean*" (Vid010).

Thus, Metaverse evangelists and technical personnel undertook the institutional work to recognize and leverage Metaverse affordances for community building. In doing so, they forged and strengthened ties among actants within the network, including the Metaverse platforms.

Fostering Generosity[20]: Development of the digital resources for the Metaverse Churches owed much to the volunteerism of gamers and tech workers. The tech creds of the pastor evangelists notwithstanding, these actors were insufficiently qualified to develop the worlds and events necessary for the development and sustaining of Metaverse churches. In some cases, volunteers developed worlds using the platform resources available free of cost. For example, Pastor Koko described her creation of the VR MMO Church world:

> "*We've made a free company. A free company has a house in Shirogane which is like their Far Eastern living quarters housing quarters and we've got a house. So it's basically a house Church there in the community that you can actually go visit on the Siren server in North America – Aether Siren server*" (Vid003).

[20] Fostering generosity holds significant importance in metaverse churches due to their characteristics of lower levels of obligation and a diminished sense of in-person presence. However, during an interview with Meta Angel, I discovered that this practice is also commonplace in real-world churches.

In other cases, pastors began by outsourcing a basic build for the church world. For example, Pastor Mike initially outsourced creation of the MetaChurchVR for $300. Shortly after he began services in the Metaverse, Erallie, a programmer who was attending church services, approached Pastor Mike on VRChat and volunteered to make the world more aesthetically pleasing and technologically intuitive. She subsequently modified the world, making it more attractive and user-friendly.

Technically savvy attendees create shared resources, provide platform-specific technical help, and provide triage for platforms with which they are less familiar. For instance, Cheddars has developed a *Metaverse Ministry Network* wiki and described his support efforts thus:

> "*I tend to be the technical help for a lot of the AltspaceVR events and then I just point people to the people who know what they're doing in Rec Room and VRChat and other platforms*" (Vid010).

Pastor evangelists publicly acknowledged volunteer efforts and expressed their appreciation. For example, in his "how to" webinar, Pastor Soto acknowledged the expertise and efforts of Pastor Koko and Cheddars, giving each airtime. He also praised the results of the efforts, for example, saying:

> "*A couple times a month we have these official … church services in Final Fantasy XIV. Every other Saturday I'll come in or whoever would want to would come in as their character would teleport over to Shirogane and then they'd go to our house, walk in, go down the stairs and that's where the Church gathering is beautifully designed – very elaborate, ornate, very unique, very decorative…*" (Vid003).

In his videos, he showcased worlds Pastor Koko built to generate an "*immersive experience*" of the scriptures. Figure 27 depicts one such example of the world she built to immerse attendees in the reading from the Bible, John 21, on Peter's fishing expedition.

Figure 27. VR MMO Church's build of the reading from the Bible, John 21



Through the institutional work of enacting and acknowledging generosity, actors within the emergent network reinforced the practice of generosity. Generosity and the reciprocation it stimulates is the basis for enduring social ties (Simmel 1964). In this way, practices of generosity also cemented actors' ties to each other.

3.5. Contributions

3.5.1. Contributions to the Study of Network Innovations

Prior research has highlighted the significance of such a network (Kauffman et al. 2000; Zhu et al. 2006), but has been relatively silent on how it can be forged in the absence of financial incentives. My work contributes to this literature in two ways. First, I highlight the salience of the actor network in the diffusion of a network innovation. Prejudice against activities conducted on platforms with animation-like digital graphics has generally categorized them as light activities with no significant obligations. However, the punctual and serious nature of church activities contradicts this notion, demonstrating that these are actually profound activities where real humans are present behind each avatar. Participants in these activities seek emotional support, psychological recognition, and a sense of fulfillment through community interaction.

Second, I identify a series of practices that contribute to the formation and reinforcement of the emergent network. The significance of these practices is further accentuated by the absence of other forms of interaction and dedication. In face-to-face interactions, we have numerous opportunities to engage, interpret social cues, and share meals together. However, with these real-life experiences currently restricted or unavailable, practices like adapting to the future, leveraging socio-inclusiveness, and engaging in voluntary benevolent acts become even more valuable.

My work also showcases the heterogeneity of actors/actants, whose agency is necessary for the diffusion of network innovations. This stands in contrast to prior work that has emphasized the role of the institutional entrepreneur as a single actor or category of

actor (e.g., Henfridsson and Yoo 2014; Johnson 2007; Tumbas et al. 2018a). This perception arises from the voluntary nature of participation in metaverse communities. Even if an entrepreneur possesses strong leadership and vision and wishes to guide the way, their efforts are rendered futile if users are not intrinsically motivated to join the community and contribute the diverse skills and talents required. The institutions I have researched primarily rely on the voluntary participation of actors. Unlike traditional institutional entrepreneurs who could closely monitor subordinates in a shared physical space, this level of surveillance is not feasible in metaverse institutions.

What is remarkable about digital events or community activities is the ability of a single programmer to have control over a universally applicable situation. For instance, even in a church world with multiple screens and sound systems to manage, a single programmer can oversee the entire setup. In a physical space, multiple individuals would be required to handle a limited number of screens or systems, leading to duplication of tasks. However, in a digital space, only a few people are needed to manage a vast amount of space. A space with 300 people, for example, can be handled by just one person responsible for the world settings. Consequently, the need for that specific task is addressed, creating room for other individuals with diverse skill sets. This research contributes to the understanding that such institutional structures will become representative forms of networks for metaverse institutions.

3.5.2. Contributions to the Institutional Work Literature

Research has often highlighted the salience of the institutional work of translation to the diffusion of innovations (Nielsen et al. 2014). A key facet of translation is forging a network (Callon 1984). By noting institutional work practices associated with forging a network, I provide insight into this key facet of institutional change beyond specifying roles and locking actors into those roles (Callon 1984). Churches that I observed in the metaverse were thriving to forge networks inside the digital space. Activities that were once considered normal and necessary to be held in person have now been successfully implemented as intangible yet prominent activities. The significance of this newly established network lies in its ability to pave the way for commonplace interactions in the near future. In essence, we are teleporting ourselves into a digital realm, assuming various forms, to engage in real-time interactions with individuals from diverse physical locations. The findings from this research will contribute to the literature on virtual teams and group collaborations, shedding light on its increasing significance. Additionally, ongoing collaboration among individuals will lay the groundwork for a more immersive experience in information exchange communities that benefit all participants. This expansion of knowledge exchange will enhance the experience by offering a higher level of immersion. It may manifest as a new form, similar to existing online forums like text-based Reddit and Quora, or voice-based social chatting platforms like Clubhouse[21][22] (Carvalho et al. 2020; Zhang et al. 2019; Zhao et al. 2021).

[21] Source: https://www.demandsage.com/clubhouse-statistics/

[22] Source: https://www.thinkimpact.com/clubhouse-statistics/

3.5.3. Contributions to the Metaverse Literature

Earlier, I noted that, as a locale for pluralistic experiences, the Metaverse presents a collective action problem. Nickerson et al. (2022) posited that designers permit narrative composability, social assortativity, and path discoverability to offer the pluralistic experiences that draw actors to and retain them in the Metaverse. Our observations in the Metaverse reveal these three facets to varying degrees. Narrative composability, though present, was not seamless. Glitches were directly observed as well as revealed in informants' disclosures of when trolls turned out not to be trolls, but accidental arrivals in an inappropriate space. Social assortativity and path discoverability emerged through my repeated engagement with the Metaverse. Specifically, the more people I got to know in the Metaverse, the more referrals I got to similar others and the more information I got on venues I might find enjoyable.

3.5.4. Contributions to the Methods

In this research, I utilized netnography to observe phenomena within metaverse communities, including metaverse churches. I have found this method to be an ideal way to collect data from users existing solely in the online space, irrespective of physical distance. However, it is worth noting that netnography is still in the early stages of development as a qualitative research method (Kozinets 2022). There is great potential for netnography to grow into an extensive field in the future of research, building upon the existing ethnography literature and capable of collecting a variety of rich data. As

society becomes increasingly digitalized, this relatively novel research method is poised to succeed conventional ethnography-based methods.

4. REFLECTIONS

In this final chapter, I reflect on my experiences with the metaverse platforms I used and the unanswered questions those experiences raise. I then reflect on the unique challenges the metaverse poses for netnographic investigations.

4.1. Platform Experiences and Unanswered Questions

The potential for metaverse platforms is boundless. Yet, virtuality and other environmental factors give rise to a multitude of problems – some typical of new platforms and other hitherto unanticipated. Below, I briefly overview a few known problems associated with this phenomenon and the unanswered questions associated with these problems. These include the psychological impacts of platform use, governance challenges, and copyright and ownership concerns.

4.1.1. Psychological Impacts of Metaverse Platforms Use

Metaverse proponents argue that the metaverse can be utilized positively as a test bed for technology (Chaturvedi et al. 2011; Lacity et al. 2023). The platforms provide an opportunity for people to practice conversations with strangers and develop social skills to navigate various situations. Additionally, individuals can leverage the metaverse to meet people from specific countries and engage in language practice. For instance, the research highlights how people use the metaverse to attend church sessions in the United States or participate in services that are more inclusive towards gender minorities. This opens up new possibilities and broadens horizons. However, it is

important to note that the satisfaction derived from the virtual world may not always translate to real-world satisfaction. The absence of tangible experiences poses a significant challenge.

Moreover, the concept of unlimited freedom raises concerns about safety and the quality of conversations and networks formed. While the freedom to meet without strings attached may initially seem appealing, it often leads to shallow human connections. People with whom one interacts regularly in the virtual space can suddenly relocate to a new city with poor internet connectivity, rendering them unable to continue their online presence. This transition can be jarring, and individuals may even decide to vanish without warning. These situations often result in the realization that the interpersonal connections in the virtual space were merely superficial and lacked depth. This disappointment in human connection can contribute to the emergence of an inhumane and cold society where people prioritize superficial interactions over genuine relationships. The value of true relationships and meaningful human interaction becomes disregarded. As an example, church members who experienced internet lag due to system failures often left the virtual church community and never returned. While some individuals voluntarily return occasionally to foster generosity, the network that had been established lacks a strong sense of obligation to maintain sustainability when real-life circumstances change.

In essence, the metaverse presents a complex landscape with both positive and negative aspects. While it can serve as a valuable tool for technological advancement and social

skill development, it is crucial to address the limitations and challenges it poses. Striking a balance between freedom and safety, as well as promoting genuine human connections, is essential for ensuring a healthy and thriving metaverse environment.

These complexities of the metaverse environments raise a multitude of questions regarding the potential dark side of this emerging technology, perhaps especially for the more vulnerable segments of society. Can metaverse platforms afford such people inclusion that they otherwise lack? Or do the platforms simply exacerbate the societal divides that already exist? In what ways is the psychological safety of individuals compromised by metaverse platforms? What sort of governance structures are essential to the safety of all metaverse users? This last question raises yet another critical set of challenges facing metaverse users – i.e., governance.

4.1.2. Governance Challenges

The issue of governance is a significant concern in the context of the metaverse. When a game or platform is considered a metaverse, the question arises: who are the governing bodies? Are they truly capable of managing a virtual world populated by numerous individuals? Establishing criteria for blocking or banning users who engage in extreme religious ideas or other negative activities, such as obscenity, potential violence, or psychological harm to underage individuals, becomes crucial. The absence of an overarching governing body in the metaverse may lead to ethical and moral concerns. Similar challenges have been observed in online media, online games, MMORPGs, and

social media platforms. Defining and implementing standards for normal and healthy usage is a complex issue that requires careful consideration.

To illustrate the challenges of governance in the metaverse, let's consider an incident involving the Loli Police Station in VRChat from my observations. During a role-playing scenario, the Loli Police Officer became overly aggressive towards another user, who was playing the role of a manager at a virtual K-Mart. Despite being asked to tone down their behavior, the Police Officer persisted, disregarding the other user's discomfort. In response to this incident, the K-Mart manager decided to report the incident to the higher management of the police station, including the chief, seeking appropriate measures to address and prevent such situations in the future. While there are rules in place for joining the Loli Police Station Group in VRChat, the question arises: what are the consequences for vexing another user solely for entertainment purposes? In this particular case, the worst possible outcome would be a ban from the group, resulting in the individual being unable to use the iconic Loli Police avatar. However, the governance in this scenario is perceived as weak. Additionally, the person who violated the rules has the option to create a new VR account and assume a new role as a police officer, thus evading any lasting consequences. This example highlights an important aspect of virtual spaces: anonymity. While the use of fake identities or avatars is a serious concern in real-world situations, it is allowed and prevalent in the virtual realm. The effectiveness of governance in the metaverse relies heavily on the user's morals, personality, adherence to rules, and the platform's measures to prevent and address mishaps.

Creating a robust system of governance in the metaverse requires addressing the challenge of anonymity while balancing freedom of expression and ensuring a safe and ethical environment. It involves implementing mechanisms to enforce rules, deter inappropriate behavior, and provide avenues for reporting and resolving conflicts. Developers and platform operators play a crucial role in designing and enforcing policies that promote responsible behavior, protect users from harassment or harm, and establish consequences for violating community guidelines. Furthermore, collaboration between platform operators, community members, and external entities, such as regulatory bodies, can contribute to a more comprehensive governance framework. Ultimately, the goal is to create a metaverse where individuals can freely express themselves within the bounds of respect and consideration for others. Striking the right balance between freedom and accountability is an ongoing challenge that requires constant adaptation and refinement of governance mechanisms in virtual spaces.

Indeed, the comparison to Freetown Christiania in Denmark is an interesting one when discussing the governance challenges of the metaverse. Freetown Christiania, established in 1971 as a self-sufficient commune, operates without a formal government structure. It has attracted attention for its unique social and economic dynamics, including the controversial free trading of cannabis (Pasley 2023). At first glance, Freetown Christiania may seem to function well economically, with its own system of trade and self-sustainability. However, over time, issues such as gang activities, drug dealing, and an increase in crime have arisen, particularly in recent years following the

COVID-19 pandemic. The complex nature of this community has led to its characterization as a "social experiment."

This parallel can be extended to the metaverse or platforms that enable the existence of the metaverse. Just like Freetown Christiania, these virtual spaces lack a centralized governing body. While this can provide users with a sense of freedom and autonomy, it also raises concerns about potential negative consequences. Without effective governance mechanisms, virtual platforms can become breeding grounds for harmful activities, ranging from cyberbullying and harassment to illicit content sharing and real-world harm. The absence of clear rules, regulations, and enforcement measures can lead to an environment that is conducive to misuse and abuse. To mitigate these risks, it becomes crucial to establish guidelines, policies, and mechanisms for addressing issues within the metaverse. This includes implementing moderation systems, reporting mechanisms, and user-driven content moderation. Collaborative efforts between platform operators, developers, and the user community are essential to ensure a safe, inclusive, and responsible metaverse experience.

Drawing lessons from real-world examples like Freetown Christiania, it is evident that a balance must be struck between allowing individual freedom and ensuring the well-being and safety of users. By learning from the successes and failures of existing social experiments and alternative communities, we can work towards developing robust governance frameworks for the metaverse that promote positive interactions, protect users, and foster a thriving virtual society. One potential approach to addressing this

governance gap is to rely on the more mature members of the community. These individuals can assume responsibility for moderating and handling issues within their respective groups. By promoting a culture of responsible behavior and setting community guidelines, they can contribute to fostering a safer and more ethical metaverse environment. However, it is important to recognize the limitations of this approach. Reliance solely on the more mature population may not be sufficient to address all governance challenges. A more comprehensive framework that involves a combination of user moderation, platform policies, and external oversight might be necessary to ensure ethical standards are upheld.

Establishing effective governance in the metaverse requires collaboration between platform developers, community members, and potentially even regulatory bodies. It entails defining and enforcing rules and guidelines, implementing mechanisms for reporting and addressing misconduct, and continuously adapting to the evolving landscape of virtual interactions. Finding a balance between freedom of expression and preventing harmful behaviors is a delicate task. It necessitates ongoing discussions, transparency, and the involvement of diverse stakeholders to shape the metaverse into a space that promotes positive experiences while safeguarding the well-being of its users. Ultimately, the issue of governance in the metaverse presents an opportunity for collective action and innovative solutions. By addressing the concerns surrounding ethics and morality, we can work towards establishing a metaverse that embraces inclusivity, safety, and responsible use, thus unlocking its full potential as a transformative virtual realm.

4.1.3. Copyrights and Ownership of Assets

The recent closure of AltspaceVR has generated significant controversy[23]. The decision by Microsoft, who acquired AltspaceVR, to shut down the service came as a shock to many users. Upon the announcement of the shutdown, users hurriedly attempted to save their data, but the environment and memories built within the platform were mostly lost forever. In other words, the portability of data from one platform to another was very low or, at best, inefficient. The platform had fostered a strong community over the past 10 years since its establishment in 2013. As is often the case with gaming platforms that have a large user base, the sudden closure can be a jarring experience. It is one thing to voluntarily quit an activity, but it is entirely different when the option to return is taken away permanently. On the day of the shutdown, users gathered to bid farewell and commemorate their final moments together. There was a sense of mourning and nostalgia in the air. One notable event was when Youtuber Cara Mandel captured and shared a poignant moment of enforced silence, reminiscent of a power cord being abruptly pulled from its source. Figure 28 depicts the Youtube video by Cara Mandel.

[23] According to *Meta Angel*, who works with Microsoft, AltspaceVR had its services terminated by its owner, Microsoft. This termination was due to budget-related issues and the implementation of a new system called Microsoft Mesh, which required a brand-new set of programming languages. Microsoft had acquired AltspaceVR in 2017 from its original founder, Eric Romo. Eric Romo created this metaverse platform in 2013, but the decision to terminate its services was made by Microsoft in light of the budget constraints and the need to focus on the development of Microsoft Mesh.

Figure 28. RIP AltspaceVR, March 10, 2023[24]



The closure of AltspaceVR[25] had negative effects on individuals like Pastor Koko. The abrupt end of the platform, as well as the discontinuance of the relevant programming packages, impacted not only her metaverse platform experience but also her personal business operations of teaching web design. Overall, the Sunsetting of AltspaceVR disrupted the connections and experiences that users had developed over time. It highlights the emotional impact that such closures can have on the community and the individuals involved. Instances like the AltspaceVR shutdown serve as a reminder of the transient nature of virtual platforms and the potential loss of virtual environments and memories. They also raise questions about the longevity and sustainability of virtual communities and the responsibility of corporations in handling platform closures. Overall, the closure of AltspaceVR left a significant impact on its user base, prompting discussions about the preservation of virtual spaces and the emotional toll experienced when virtual worlds come to an end. It serves as a valuable lesson in the evolving

[24] Source: https://www.youtube.com/@CaraMandel/videos

[25] Source: https://www.oculus.com/experiences/quest/2133027990157329/

landscape of virtual platforms and the need for careful consideration in managing their lifespan.

4.2. Netnography in the Metaverse

Netnography has come to be understood as a methodology that complements conventional ethnographic endeavors of observation and interviews with forays into digital archives of social traces or substitutes conventional ethnographic observation and interviews with investigation of those digital trace data. Netnography in metaverse platforms reflects a heightened level of complexity relative to netnographies as currently understood. Further, unlike conventional netnographies, metaverse netnographies permit deep connections with informants and other participants. These connections raise ethical challenges in what the researcher should reveal and how. Below, I reflect on these two challenges.

4.2.1. Observation and Interviews in a Novel Social Venue

Rather like the venues in which the anthropologists who developed ethnographic methods found themselves, metaverse netnographies require the investigator to first transport herself to a different venue, in which material cues have to be interpreted and social rules learned. This proved even more challenging, given the emerging nature of the material and social environments on metaverse platforms.

These sociotechnical systems in flux especially challenged my ability to understand self-presentation, one of the focal problems I wished to address.

4.2.2. Ethics of Observation and Disclosure

Through my participation in the metaverse platforms over the last year, I have developed deep relationships with other users. Often, because of these relationships I have witnessed unguarded and emotional expressions by these users. These moments have contributed greatly to my ability to understand the problems I studied. Yet, I have been conflicted about how much to reveal, even when anonymizing reported events. I opted to seek consent from all individuals I would be referencing or quoting – even if those references or quotes were anonymized. Nonetheless, because of my relationships with these users, I cannot discount the possibility that they granted permission because of the connections they experienced and their desire for me to succeed. I have therefore tried to be as sensitive as possible in what I have revealed and how I have done so.

5. CONCLUSION

Self-presentation and identity work are an ongoing human project in evolving metaverses. Unfortunately, there is yet little understanding into how these processes are afforded on metaverses and play out for disparate actors. My work problematizes self-presentation in metaverses and begins to shed light on how it comes to be a problem and how cognizant actors navigate it.

Another problem critical to metaverse applications will be mobilizing users. As a network innovation, developers and others interested in deploying the applications cannot rely on designing applications that account for conventional antecedents of use – i.e., usefulness and user-friendliness. Rather, they need to convince prospective users and complementors that the experience experiences and uses they seek will materialize. My work provides insight into how interested stakeholders can promote diffusion of other metaverse applications that represent network innovations.

As technology continues to advance, we can expect further developments in the metaverse space, including improved VR experiences, augmented reality integration, advancements in AI, and more seamless connectivity. The future of the metaverse will likely be shaped by ongoing innovation, collaboration, and the evolving needs and expectations of users.

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7. APPENDICES

APPENDIX A. INTERVIEW PROTOCOL

Theme: *Avatar, environment, and presence: identity representation in VR.*

Definitions of some vocabs are listed below the table.

Interview target: 18+ adult users, *Themed World Creators

Anticipated interview duration: 30-60 minutes per person

Potential list of target worlds: The Great Pug, Adrift, Fur Hub Portals, Furry Talk and Chill, Virtual Church, Just Dance, Beat Saber, Virtual Club, Hygge…

Recruitment: Random via VRChat, via direct messaging (DM) to the user's Discord server account or Twitch account that are linked to their VRChat account.

Interview style: semi-structured

Focus: Avatar, environment, on what VR platforms and technologies they are using, why they are using them, and how they use of technologies.

Goal: Find out what a user thinks of 1) The VRChat World 2) Their VRChat avatar(s) 3) Themselves in the VRChat World, and what it means to them.

	[1] For Normal Users	[2] For Themed World Creators[26]
Demographics	• How old are you? • What device do you use? (Oculus [Quest, Quest 2, Rift], SONY, HTC Vive, DPVR, Pico, Other) • How long have you used VR devices? (approximate hours, if you had not activated the hour-count function in your VR device?) • How long have you played VRChat? (approximate hours, if you had not activated the hour-count function in your game?)	
Reason for engaging in virtual reality socializing platforms	• What VR apps and games do you use to socialize? What do you like about these? What do you not like about these? ■ Which one of those apps and games do you mainly go to, and why? ■ What do you think is unique about VRChat than other apps/games? • What is the most important factor that makes you continue to use VRChat? • Why or how did you choose/create that VRChat ID for yourself? (Does that affect your purpose of existence in the VRChat World?) • How do you feel when you are asked to conform with the rules in a World, and why?	
Reason for creating a space /environment in VR		***Creation*** • What was your main focus or goal when creating your World (themed Worlds)? • Did you develop this World alone or as a team with a group of people you already were acquainted with (as partners? share ownership?)? Or did you create this World by contracting/outsourcing? (Or were you all voluntarily gathered without profit to create this World?) ■ If the latter, how did you make it possible in terms of the funding? • What tools do you use to develop these spaces and how are these more useful than other tools? • What type of development strategy are you pursuing? In other words, is your strategy developing the World over time or having most of it done before opening up the space? ***Operation***

[26] For World Creators, or whoever had at least one experience having created a world, they were asked all the same questions asked to normal users. Therefore, the interview questions table was created like so.

		• What are your expectations or rules that you are asking for the users of your World to follow or keep?
		• I'd like to ask about the accessibility of your World. Is it open 24/7, is there a peak time despite having it open 24/7, or is it only run at a specific time of the day of a week, and why?
		  ■ Via what source do you let others know about your World's availability? (Discord? Twitch? Twitter? Other?)
		• In what way do you run your World? In other words, does your World (system) require you to be present while others use the space?
		  ■ (When the creator must be present) When you are not able to be *present*, do you hire moderators (mods) or delegates? What is the qualification for a user to become the moderator of your World?
		• What excites you about running this World?
		• What was your purpose for making that space in terms of interaction with others? (To simply mingle with other users in that space? To provide a place mainly for other people to mingle? To do/achieve what?)
		• Do you have moderators(mods)? How did you recruit them?
		• Do you broadcast your World's activities on a different streaming website? (ex. Twitch, Youtube, Tiktok, etc.)
		• Have you thought of interacting or communicating with creators of other World(s)?

Avatar—Identity	***Observation on self*** • Do you have a preference for a type of avatar? (anime, furries, other cute/military/scary etc.) • Can you explain what your avatar is? (or, from what source that avatar was derived from/type/character's name if possible) • What is a (furry/furry in denial/anime girl…etc.) to you? • In general, do you think your avatar looks similar/different from your IRL self? • What do you do IRL? (Employed? Student? In what area(s)? • Do you feel that you are *using* the avatar to roam around in VRChat, or do you feel that you yourself *are* that avatar while using VRChat? • There are mainly two ways to choose an avatar: randomly picking every time you enter the World, or having a main avatar of your own that you use in general, no matter what World you enter into. Which do you prefer, and why? • When using your avatar, what are some of the feelings you have experienced? For example, does your avatar give you a sense of	

	confidence/happiness/satisfaction/connection/immersion/distress/fear/discomfort? Can you give me examples of situations when you had these experiences? • Have you felt phantom touch? Do/would you think that experience can make you more real (realistic) and present in VRChat? • When or for what reason do you typically decide to change your main avatar or add another avatar (to use often or temporarily)? ***Evaluation by others*** • Think of a situation when someone reacted favorably to your avatar. Can you tell me about it? • Think of a situation when someone reacted unfavorably to your avatar. Can you tell me about it? • People say that your avatar may be the representation of yourself to the World you are in. Would you agree or disagree, and why? • In what ways Is this different for platforms other than VRChat?
	• What is your opinion on whether appearing in a certain avatar would help you to run the World more effectively?
Use of avatar in VRChat— the *socializing aspect*	• Do you hang out with your IRL friends in VRChat? Have you met your VRChat-only friends IRL? Is there a reason why you mix/separate your friends group? • Do you think VRChat community is more/less accessible than IRL communities? • Do you feel more comfortable/uncomfortable talking to others in VRChat than IRL? • Do you feel more comfortable/uncomfortable showing/explaining who you are to others in VRChat than IRL? • Do you feel more/less vulnerable when you are judged in VRChat than IRL? • Have you been bullied because of the appearance of your avatar?
General Conclusion	• What else should I be asking people about their use of VRChat?
End	Thank you for your time!

APPENDIX B. GLOSSARY

- ***Anime***: Japanese animation style characters. In general, they have big eyes, cute child-like faces, and slender yet physically appealing body figures.
- ***Furry***: pl. furries. Avatars that are animals with furs. (e.g. dog, cat, squirrel, wolf, etc.)
- ***IRL***: Abbreviation for "in real life"
- ***Persona***: What VRChat users interchangeably use with the word "identity" as a character or the avatar they are wearing at the moment. (Fursona: A word derived from Persona. It indicates persona of a furry.)
- ***Phantom Touch***: Just like how the people feel after amputation, a phantom touch refers to a continued experience of sensations of a virtual limb present in the virtual reality space. In other words, it is a placebo experience for a VR device users. You need to have conscious thought about it to some degree, somewhat close to a hypnosis. It is in general not a real thing that your body develops over time, but rather, something a user would continue to want to have.
- ***VRChat***: A virtual reality game that can be played either via a VR device (goggles or headsets, controller for both hands, body/motion sensor/trackers) or via PC through a game downloading and forum website called *Steam*.
- ***World***: Each virtual space that holds its own theme within the VRChat platform.