

Please quote as: Tingelhoff, F., Schultheiss, R., Schöbel, S. M. & Leimeister, J. M. (2024). Qualitative Insights into Organizational Value Creation: Decoding Characteristics of Metaverse Platforms. *Information Systems Frontiers (ISF)*, , 1-20. doi: 10.1007/s10796-024-10494-x



Qualitative Insights into Organizational Value Creation: Decoding Characteristics of Metaverse Platforms

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Accepted: 2 May 2024
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Abstract

The significance of metaverse platforms is growing in both research and practical applications. To utilize the chances and opportunities metaverse platforms offer, research and practice must understand how these platforms create value, which has not been adequately explored. Our research explores the characteristics of metaverse platforms that facilitate value creation for organizations in both B2B and B2C sectors. Employing a qualitative inductive approach, we conducted 15 interviews with decision-makers from international corporations active in the metaverse. We identified 26 metaverse platform characteristics, which we categorized into six dimensions based on the DeLone and McLean Information Systems success model. Subsequently, we provide examples to illustrate the application of these identified characteristics within metaverse platforms. This study contributes to the academic discourse by uncovering the characteristics that shape the competitive landscape of emerging metaverse platforms. Leveraging these characteristics may offer metaverse providers a competitive edge in attracting complementary organizations to their platforms.

Keywords Metaverse Platform Ecosystem · Organizational Value Creation · Platform Characteristics · Complementors

1 Introduction

Recently, companies have begun to invest in metaverse platforms. McKinsey and J.P. Morgan project the metaverse as a trillion-dollar opportunity (McKinsey, 2022; Moy & Gadgil, 2022), while Gartner predicts 30% of companies will serve customers via metaverse platforms by 2027 (Gartner, 2022). This culminates in JP Morgan's assessment, emphasizing that "metaverses will likely infiltrate every sector in some way in the coming years" (Moy & Gadgil, 2022). Indeed, with annual spending over \$54 billion, expenditure

on metaverses nearly doubled that of music purchases in 2021 (Moy & Gadgil, 2022). Researchers attribute this growth to metaverses revolutionizing virtual societal and economic interactions (Di Pietro & Cresci, 2021). Specifically, the metaverse benefit from network effects, becoming more appealing as user and organizational participation increases (Gawer & Cusumano, 2014; Tingelhoff et al., 2024). Accordingly, metaverse users benefit from the presence of more participating organizations, and reciprocally, having many users renders the metaverse more attractive for organizations (Kim et al., 2016).

While research deems metaverses only as viable once many users and complementors participate, about 500 companies already joined a metaverse platform, which only amounts to about 0.00015% of all companies (Brimco, 2024; Newzoo, 2022). A major contributing circumstance to the discrepancy of predicted and actual predicted and actual corporate engagement in metaverses is the inconsistencies of how different metaverse platforms influence organizational value creation. While past studies have examined how organizations mitigate challenges when creating value on metaverse platforms (e.g., Schöbel & Tingelhoff, 2023), organizations find it challenging to join metaverses due to the diverse ways in which various metaverses support value

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creation. Ultimately, it has not been fully explored how organizations can utilize characteristics of metaverse platforms (e.g., personalization and immersion) in their offerings to maximize their value proposition. When selecting a metaverse platform, organizations must prioritize its characteristics carefully to guarantee it fits their strategy. This study aims to uncover which metaverse platform features aid or hinder organizational value creation, leading to the following research questions:

RQ1: What platform characteristics influence an organization's ability to create value on a metaverse platform?

RQ2: How have these characteristics already been configured in existing metaverse platforms?

This study seeks to contribute towards the research questions using qualitative data. We analyzed interviews with 15 decision-makers, all tasked with strategizing for corporations' engagements on metaverse platforms. We built on the DeLone and McLean Information Systems success model (D&M IS success model) (DeLone & McLean, 1992, 2002, 2003) to structure our data collection and analysis. From this, we identified 26 platform characteristics across six dimensions. Furthermore, we discovered these characteristics, such as accessibility and privacy, play different roles in metaverse platforms compared to traditional ones, a topic we expand on in our discussion. To substantiate our findings, we illustrate how these characteristics are divergently implemented in two existing metaverse platforms: Roblox and Decentraland.

Our study deepens the understanding of how organizations adopt metaverse platforms, laying groundwork for future research into corporate activities within these platforms. The study also broadens our knowledge of how emerging technologies' features support value-creation, beyond known platform mechanisms. Our results can help metaverse providers design more effective and appealing platforms. Moreover, by clarifying which platform features affect value creation, our study aids organizations in deciding how to offer their products or services on metaverse platforms. In summary, this study enables informed decisions about engaging with metaverse platforms for organizations.

This paper is structured as follows. The next section introduces foundational knowledge on metaverse platform ecosystems and outlines the structuring of their characteristics. Following that, we detail the methodology, then report and analyze the study's results. Subsequently, we exemplify our findings with case studies of two prominent metaverse platforms. In the sixth section, we explore the study's limitations and suggest directions for future research. The paper concludes with a summary of key insights.

2 Theoretical Background

2.1 The Metaverse Platform Ecosystem and How It Can Create Organizational Value

The metaverse is a multi-user virtual platform built on Web3 technology to revolutionize how people interact in any context (Di Pietro & Cresci, 2021). The malleable features of this emerging platform generate an immersive user experience, mimicking the real world sans physical constraints (Jaynes et al., 2003), thus enabling new and richer kinds of social and business interactions (e.g., through immersive 3D communication) (Bourlakis et al., 2009). By combining technologies like self-sovereign identity, virtual reality, and blockchain, these platforms evolve into parallel societies and economies. Though social media platforms (e.g., Facebook) or e-commerce platforms (e.g., Amazon) have already impacted human interactions and purchasing behaviors, this unique technology blend is unprecedented in virtual environments (Wang et al., 2021), enabling users to construct a parallel life with all its facets (i.e., work and leisure) in one platform for the first time.

The organizational structures around metaverse platforms classify them as an emergent platform ecosystem type (Schöbel & Leimeister, 2023). An ecosystem can be described as the underlying structure among partners, designed to enhance interactions and deliver a core value proposition (Adner, 2017). Generally, Typically, a platform is any product, service, or technology used by ecosystem actors to innovate and create complementary offerings (Gawer & Cusumano, 2014). It is typically integrated into ecosystems to help actors fulfill their value propositions (Gawer & Cusumano, 2014). For instance, the Apple App Store is integrated into the Apple ecosystem, including hardware and operating systems, enabling partners to create valuable apps and services.

Value is defined by an individual's overall utility assessment based on their perception of input and output (Zeithaml, 1988). Two processual value components exist: use value and exchange value (Bowman & Ambrosini, 2000). Use value describes the recipient's perception of a product or service based on their needs and values. Thus, use value stems from an organization's products and services, shaped by the recipient's personal and situational evaluation. Conversely, exchange value is what the recipient is willing to give in return for the use value. It can take other forms than monetary compensation, such as brand awareness or customer relationship, and is realized through the reciprocal transfer via the platform (Sanders & Simons, 2009).

Platform ecosystems comprise three major roles: platform leaders, complementors, and users. Platform leaders (or orchestrators) are the providers of the platform ecosystem (Gawer & Cusumano, 2002; Oliveira et al., 2019). They orchestrate the platform and are responsible for its regulation, maintenance, and adoption of standards within the ecosystem. Complementors provide products and services built for the platform, enhancing the ecosystem's core value. Lastly, users procure the complementors' products and services via the platform. Usually, they access the platform and its complementary offering directly through a user interface. Consequently, in a metaverse platform ecosystem, value creation occurs through the reciprocal exchange of use and exchange values between complementors and users. Users receive products or services in the metaverse (use value) and are willing to compensate complementors with money and attention (exchange value). Accordingly, complementors are the source, users are the target, and the metaverse platform is the locus of value creation.

Some researchers contend that metaverse platform ecosystems challenge traditional role allocations (Schöbel & Leimeister, 2023). Notably, metaverse platforms represent early examples of decentralized governance models (Goldberg & Schär, 2023). Decentralized platforms are collectively owned by stakeholders rather than a single orchestrator. This collective ownership model is known as a Decentralized Autonomous Organization (DAO). On such a platform, users and complementors can impact decisions about platform governance, such as technical standards or the maximum amount of land created for users. This shifts the power balance among ecosystem participants, unlike in traditional platforms. In decentralized platforms, power is distributed; complementors and customers can propose and implement changes, not just the orchestrator (Goldberg & Schär, 2023). reducing the orchestrator's role also affects the direct relationships between customers and complementors (Yoo et al., 2023). While traditionally, both parties only interacted through the platform and, hence, the orchestrator, metaverses enable customers and complementors to interact directly. This is further emphasized by the fact that a metaverse does not require transaction intermediaries (e.g., banks). Specifically, the metaverse enables the direct exchanges of value items (Tapscott & Tapscott, 2017). This uniqueness to metaverse platforms potentially leads to simpler, more flexible, and efficient business processes by reducing communication complexities.

While many researchers contributed conceptualizing the metaverse, Schöbel et al. (2023) made the first effort to distinguish different types of metaverse platforms. Their taxonomy evaluates the technologies in a metaverse platform's infrastructure to highlight differences in value propositions. For example, they argue that a metaverse platform

ecosystem like Decentraland focuses more on the creator economy and, hence, the creation and distribution of value items. In contrast, game-based platforms like Roblox focus on entertaining experiences that deepen user-brand relationships, alongside transactional value. This visualizes the paucity of platform types and business foci under the metaverse umbrella.

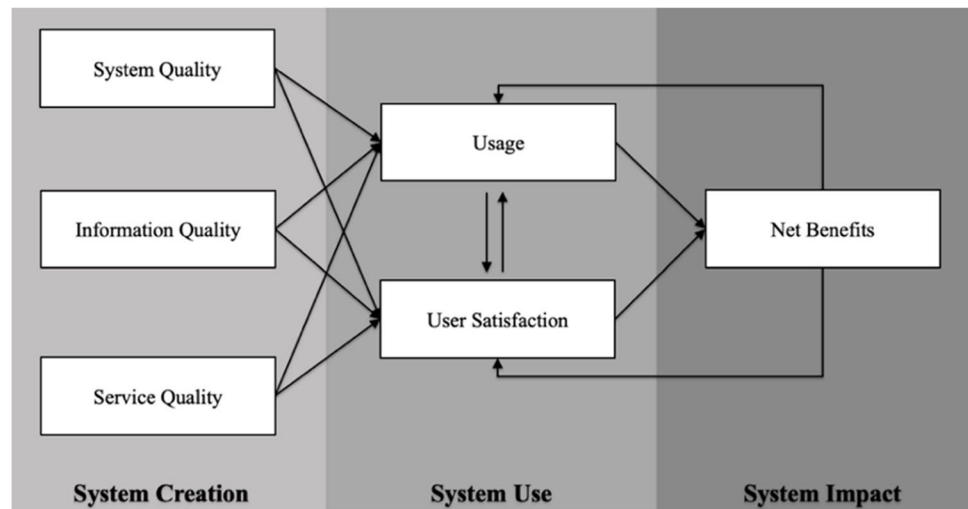
2.2 The DeLone and McLean IS Success Model

Identifying key success factors for organizational value creation is essential for insights that stay relevant in the rapidly changing metaverse platform ecosystems (Schöbel & Leimeister, 2023). In this context, past research employed value creation or value co-creation theory, predominantly focusing on aspects of value creation that are within an organization's control. For instance, value creation theory typically centers on the consumer's perceived assessment, which organizations can influence by modifying their offerings or engaging in value co-creation with consumers. This aspect of how organizations can steer this process has been explored in existing literature, including in the context of the metaverse (e.g., Schöbel & Tinglehoff, 2023; Tinglehoff et al., 2024).

Conversely, our study examines platform characteristics that impact an organization's ability to create value. These external factors, often outside organizations' control, significantly influence value creation dynamics in technology-driven settings like metaverse platforms. In this context, the DeLone and McLean IS success model (D&M IS success model) (DeLone & McLean, 1992, 2002, 2003) has emerged as a cornerstone in the domain of Information Systems (Wang, 2008), enabling analysis of platform characteristics and their effects on organizational value creation. It provides a multifaceted perspective, deconstructing information systems into six key dimensions: information quality, system quality, service quality, usage intentions, user satisfaction, and net benefits.

Firstly, metaverse platforms are inherently complex digital ecosystems that thrive on exchanging information (Schöbel & Leimeister, 2023). The dimension of *information quality* is directly tied to the nature of data presented in metaverses, its accuracy, timeliness, and relevance. High-quality information will invariably influence user and organizational decision-making within a metaverse platform (Balica et al., 2022). *System quality* mirrors the technical prowess of a metaverse platform. As immersive environments, metaverse platforms demand high system performance, ease of navigation, and reliability. The better the system quality, the more seamless the user experience, thus attracting more complementors (Schöbel & Tinglehoff, 2023). *Service quality* in the metaverse context indicates the support structures in place. This could involve technical

Fig. 1 Research Model, based on DeLone and McLean (1992, 2002, 2003) and Ahlan (2014)



support, user guidelines, and assistance in content creation (Park & Kim, 2022). A high-quality service structure can significantly enhance the desirability of a metaverse platform for users and, in turn, organizations (Jo & Park, 2022).

The next dimensions, *usage intentions* and *user satisfaction*, arise from the interaction of the prior dimensions. Usage intentions resonate with how frequently users and organizations engage with the metaverse platform. A platform with a higher intent of usage becomes a hotspot for value creation and exchange, which is paramount in a networked environment like the metaverse (Ataman et al., 2023). Conversely, increased user satisfaction levels in a metaverse indicate that the platform effectively meets or surpasses the multifaceted expectations of users and organizations. When users are satisfied with their experiences, they are more likely to invest time, resources, and encourage peer participation, thus amplifying the platform's network effects and cementing its value-creation potential for organizations (Golf-Papez et al., 2022).

Lastly, the dimension of *net benefits* encapsulates the tangible and intangible outcomes that organizations derive from their engagement with an information system. When organizations can measure the positive impact of their involvement in a metaverse platform—whether in terms of revenue, brand recognition, skills acquisition, or social connections—it reinforces their commitment to the platform and ensures sustained engagement (Polyviou & Pappas, 2022). This sustained engagement, powered by recognized net benefits, can indicate the platform's long-term value-creation potential for organizations (Periyasami & Periyasamy, 2022).

While the D&M IS success model is tried and tested across various IS contexts, its inherent adaptability makes it particularly apt for metaverse platforms. The model's validity at both individual and organizational levels (Petter et al., 2008) makes it a versatile tool for understanding an emergent and complex environment like the metaverse.

Furthermore, previous validations of this model in diverse IS environments, from enterprise systems to e-commerce platforms (Wang, 2008), have shown its robustness and adaptability (Ahlan, 2014; Al-Kofahi et al., 2020). Applying it to the metaverse, an amalgamation of various IS types, seems like a logical progression.

The essence of the D&M IS success model is its capability to elucidate key dimensions that contribute to its capability to support complementors to create and deliver value through an information system (Wang, 2008). Yet, the interplay of these dimensions over time and the progressive stages of adoption need to be considered for a more comprehensive understanding. This aspect is vital as it bridges the D&M IS success model with real-world technological adoption behaviors and patterns, making it more contextually relevant, especially for evolving digital realms like the metaverse. By integrating process steps, one can understand not just *what* supports value creation (as indicated by the D&M IS success model) but also *how* and *when* these characteristics manifest and influence organizational value creation over the adoption lifecycle. To expand theories for a temporal interplay of characteristics, Ahlan (2014) proposed three process steps: system creation, system use, and system impact. This hierarchical order of influence characteristics can be applied to the D&M IS success model, where information, system, and service quality correspond to the system creation, usage intention and user satisfaction to system usage, and net benefits to system impact. The combined model is depicted in Fig. 1.

The initial phase of any technological endeavor involves its conceptualization, development, and implementation (Weber et al., 2023). This phase is particularly crucial within the metaverse context as it lays the foundation for the user experience. Information, system, and service quality become essential metrics at this juncture. The quality and relevance of information guide the design and functionalities of the metaverse platform (Bayraktar et al., 2023). System quality ensures the

platform's technical soundness and scalability, which is vital to handling the dynamic nature of the metaverse's ever-evolving virtual landscapes and foundational technologies (Peukert et al., 2022). Service quality, conversely, pertains to the support mechanisms, ensuring that complementors have a smooth onboarding process and immediate resolution to any technical hitches (Xi et al., 2023). A robust system creation phase, bolstered by these quality metrics, sets the tone for subsequent adoption and usage.

Once a system has been created and launched, its success is predominantly gauged by its acceptance and the extent of its use. Here, usage intention is a precursor, indicating initial interest and potential adoption rates (Jeong & Kim, 2023). However, for the system to embed itself into the daily routines of users and organizations, satisfaction becomes pivotal (Xi et al., 2023). As users engage with the metaverse platform, their experiences, which are shaped by immersive interactions, realistic representations, and the fulfillment of intended purposes, dictate their satisfaction levels. Satisfied users not only continue their engagement but also promote organic growth through positive word-of-mouth and peer recommendations (Mladenović et al., 2023).

For metaverse platforms, the system impact, as denoted by net benefits, encapsulates how effectively platform characteristics support organizational value creation (Polyviou & Pappas, 2022). This could manifest in diverse ways, from driving innovation in product or service offerings, facilitating unique customer engagement models, to fostering new revenue streams or enhancing brand visibility within the virtual realms (Hadi et al., 2023). Moreover, it might also encompass intangible benefits such as enhanced collaborative potentials, access to new market segments, or the ability to test and iterate offerings in risk-mitigated virtual scenarios (Yoo et al., 2023). Thus, system impact, in this context, underscores whether the metaverse platform meets the technical and experiential needs of its complementors and provides a conducive environment for organizations to harness its potential and realize tangible value.

In summary, the adapted D&M IS success model provides an exhaustive framework to unpack, understand, and measure how metaverse platform characteristics influence organizational value creation. By mapping its six dimensions to the specific characteristics of metaverse platforms along Ahlan (2014)'s process steps, this study aims to clarify the characteristics that influence organizational value creation in this burgeoning digital frontier.

3 Methodology

3.1 Ensuring the Quality of Qualitative Data

This study investigates how metaverse platform characteristics impact organizational value creation. The

phenomenon of the metaverse is relatively new, and less is known about how organizations create value on metaverse platforms. To gain exploratory insights into organizational value creation, we adopted a qualitative research method (Draper, 2004).

To ensure our qualitative data's validity and reliability, we adhered to Lincoln and Guba (1985)'s criteria: credibility, transferability, dependability, and confirmability. Credibility refers to the data's internal validity and its alignment with reality (Merriam & Grenier, 2019). We selected our interviewees based on three criteria. First, we considered whether interviewees had a holistic overview of organizational value creation. This includes individuals who are not only involved in strategic decision-making but also with a broad understanding of how various organizational units contribute to value creation. Second, as we explored metaverse platforms, our participants needed substantial experience in the metaverse sector. This ensures that our data comes from individuals who are not only familiar with the concept but are actively engaged in its application and development within their organizations. Third, we focused on participants whose organizations actively offer products or services on metaverse platforms (e.g., Roblox or Decentraland). This practical involvement ensures our insights are grounded in real-world experiences and challenges. To guarantee a similar level of abstraction and comparability of our findings, we selected interview partners based on similar levels of responsibility regarding the metaverse. Furthermore, to increase credibility and mitigate possible biases in the data collection and analysis (Valenzuela & Shrivastava, 2002), the first three authors of the paper coded the data independently. Specifically, we employed the qualitative inductive approach described by Gioia et al. (2013), which is designed to enhance qualitative rigor in conducting and presenting inductive research. This approach is particularly suitable for inductively developing grounded theory, offering rich and detailed theoretical descriptions, which, in our case, pertains to the value creation on metaverse platforms. In line with the method proposed by Gioia et al. (2013), we constructed first-order concepts, second-order themes, and aggregate dimensions, with the latter reflecting the theoretical constructs.

To ensure intercoder reliability, the coders critically discussed their initial coding results until the first-order codes were sufficiently reviewed, and a second iteration could start that led to a detailed description of our second-order constructs. During this process, the coders aimed for the codes to be on a comparable level of abstraction and still reflect the individual experiences of each informant. Our analysis was rooted in a hermeneutic approach, emphasizing the shared understanding of the nature of metaverse platforms. Following the insights of Paterson and Higgs (2005), we embraced hermeneutics for its dialogical nature, which in

our research manifested through the interviews conducted between experts and the interviewer.

To improve the transferability—whether the results of one study can be transferred to different settings with different participants—of our results, we have provided sufficient contextual information about each informant and their interview in Appendix 1. Dependability describes the extent to which the findings of a study can be replicated (Merriam & Grenier, 2019). We noticed a high degree of concept/coding saturation (95% of codes surfaced) after the 11th interview, which aligns with previous studies on the method (Guest et al., 2006) and the topic at hand (Schöbel & Tingelhoff, 2023). Finally, confirmability mainly concerns objectivity and addressing potential research biases that can result, for instance, from inherent values and beliefs but also the mere presence or timing of follow-up questions (Valenzuela & Shrivastava, 2002). We addressed confirmability by independently executing tasks simultaneously and comparing results (e.g., for data coding and interpretation). Further, all the researchers were at least aware of their potential biases and influences, which we critically, openly, and proactively addressed during the planning and execution of this research.

3.2 Data Collection

In our qualitative study, we interviewed 15 metaverse decision-makers from multilateral organizations in both B2B and B2C markets. These participants represent the mission and vision of an organization; they have the highest responsibility for their organization's metaverse strategy, were familiar with key metaverse platforms, and understood how different organizational units contribute to value creation. In other words, we interviewed CEOs and senior leaders who are deeply familiar with their organizations and can insightfully discuss how metaverse platforms align with their business models to create value. Interviewees explicitly consented to their interviews being recorded and their personal data being published, both before and after the interviews. This procedure adhered to ethical research standards, ensuring transparency and reliability in data collection.

We refer to individual participants using the abbreviation IP (interview partner) and their number (1–15). We used a structured interview guide to ensure interviewees fully understood the platform characteristics being studied. The guide featured open-ended, concise questions, supplemented with follow-up probes to resolve ambiguities. Additionally, we provided contextual information and examples where necessary to aid comprehension. We began by asking participants about their demographics. This was followed by general questions about the metaverse (how they defined it, for instance). We then focused on which platform characteristics they deemed crucial for strategic decisions regarding their metaverse offerings. We explicitly referenced the

three process steps of system creation, system use, and system impact. In addition to discussing the impact on their organizations, we invited opinions on future metaverse platform developments and their relevance to the interviewee's organization.

Interviews were held online (Lo Iacono et al., 2016) and conducted in the interviewees' native languages when possible (Harzing & Maznevski, 2002). To address the potential for translation-induced alterations, we employed a rigorous process. First, we conducted 66% of the interviews in the native languages of both interviewees and interviewers, reducing the necessity for translation. The remaining interviews were conducted in English. For interviews needing translation, a bilingual, topic-knowledgeable co-author handled the task. A second bilingual co-author reviewed and verified the transcripts against the audio recordings for translation accuracy. The interviews lasted between 26 and 56 min (mean: 34). In one interview (IP 5), technical difficulties obstructed the recording. The interviewer—in this case, the second author—immediately after the interview reconstructed the interview details from notes and memory.

We based our coding, for which we used the Atlas.ti22 software, on the transcripts (Gioia et al., 2013). The first three authors coded simultaneously and independently. According to Gioia et al. (2013), the first-order coding was an open coding mechanism that remained faithful to the words of each interviewee. Ending up with a high number of codes prompted us to summarize those codes where the informants addressed the same topic but with different terminology. Since the initial open coding was executed independently, ongoing researcher discussions shaped the final constructs. After identifying platform characteristics, we assessed their relative importance. To this end, we presented the ordered variables to our interview partners for an ordinal rating of relative strategic importance. To substantiate our findings, we showcased the highest-rated characteristics using two practical examples. Roblox and Decentraland serve as leading examples of early metaverse platforms (Schöbel et al., 2023). As current recipients of immense funding and publicity from practitioners (Kamin, 2021; Wang & Ho, 2022), they are ideal subjects for further investigation.

4 Results

In line with our research goals, we identified 26 platform characteristics and categorized them according to the six dimensions of the D&M IS success model. Additionally, our metaverse experts ranked these characteristics based on their importance and relevance to organizational value creation in metaverse environments. Figure 2 reports the characteristics per dimension ranked by their average importance

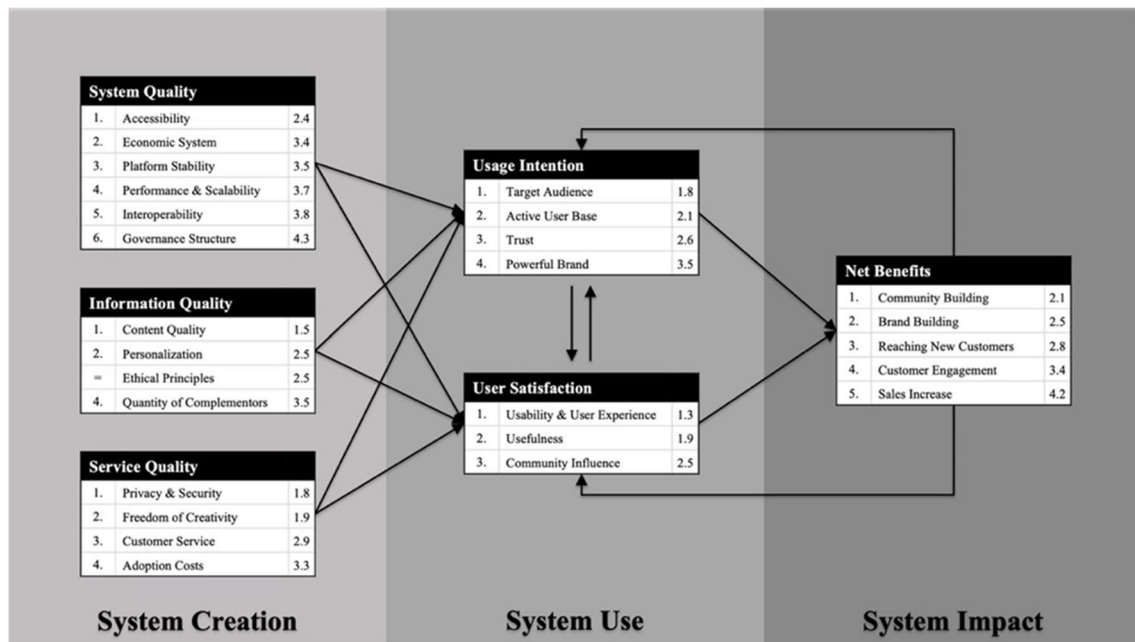


Fig. 2 Adapted Research Model (including the average ranks by IPs)

(with 1 indicating the highest importance). However, the rankings reflect the experts' average views. Though indicative of relative importance, they are not meant as precise statistical measures. Given this, we advise that small differences in rankings, particularly those within 0.1 or 0.2, may be negligible.

In subsequent sections, we detail our empirical findings and analyze each of the six success dimensions.

4.1 System Creation: System Quality, Information Quality, and Service Quality

The system quality dimension encompassed the most platform characteristics. In this dimension, interview partners (IPs 1, 2, 4, 8, 9, 12, 13, 14, and 15) ranked *accessibility*—ease of access for complementors and users—as the most crucial. The interviewees specifically mentioned that platforms must be accessible through various devices, including tablets, smartphones, and desktop PCs (IPs 1, 2, and 9). IP 9 elaborates:

It is all about being available across the devices. The more devices you have available for the platform, the easier it is to enter. I mean, as we all know, traffic is coming from mobile and desktop. [...] So, you know, if your platform is only compatible with PCs, you're missing out on a big portion of the market.¹

However, accessibility encompasses not only device compatibility but also the ease of navigating the platform's functions. "One should be able to move around and execute actions without having to read a one-hour manual," argued IP8 when asked about the necessary functionalities regarding the system quality of a metaverse platform. Similarly, IP 14 emphasized that operability is currently more important than functionality.

Interviewees (IPs 4, 12, 14, and 15) also deemed an *integrated economic system* essential. The interviewees highlighted the necessity of integrated payment systems (IP 12) and their ability to create new user experiences (IP 15). This includes a currency that offers voting rights on decentralized platforms. Further, economic systema enable new functionalities, such as play-to-earn, where users are rewarded with items or tokens of monetary value. In this way, a platform can ensure its most active users receive a higher voting share. Additionally, new business models—for instance, transferring goods from the virtual to the physical world and vice versa—require digital ownership structures that metaverse platforms must provide (IP 14).

Across all dimensions, *platform stability* emerged as the most frequently mentioned characteristic (IPs 2, 3, 4, 6, 7, 9, 11, 12, 14, and 15). Interviewees expressed concerns that platform bugs, like a faulty login page, could harm their brand image (IPs 4, 6, and 9). While some worried that these "bugs lead to users exiting the metaverse altogether" (IP11), others cautioned against entry barriers: IP12 warned that "[t]he metaverse-guest's fear about crossing the threshold

¹ All quotes were translated to English for this paper.

into the virtual immersion must be addressed for them to use it at all.”

Information quality represents the second dimension in the D&M IS success model. *Content quality* emerged as the primary concern in the interviews (IPs 3, 4, 6, 7, 8, 10, 12, 13, 14, and 15). Organizations worry about losing potential customers if the platform's overall user experience and other complementors' offerings are unsatisfactory. “So, you know, if the content is not attractive,” IP 14 explained, “people will just hop onto it, take a look, and probably never come back. If you don’t engage your participants, that becomes an issue.” Specifically, IP14 worries that a bad experience on one platform could deter customers from using any metaverse platform. Compared to other platforms, this concern is particularly pertinent for metaverse platforms given their current stage of development. Additionally, companies consider the connotation of the content produced on a platform. For instance, companies may hesitate to join game-based metaverses due to concerns that users could associate the game's characteristics with the company. IP12 specified this concern: “We try hard to avoid becoming a Disneyland. This is not just a game and fun. It is totally okay if it is around fun; that is not wrong. [...] Even though a platform might have entertainment aspects, we also want to be able to educate our customers in a serious manner.”

Personalization (IPs 1, 8, 11, and 14) is another integral metaverse platform characteristic. This encompasses two facets of customization. First, organizations aim to align their virtual presence with their brand identity: “Nobody wants to access a generic platform with this great template-world. No, everybody wants their own logos, their own trees, their own information channels” (IP 11). In addition to platform design flexibility, organizations also aim to offer personalized products to their customers. This introduces several technological challenges, as discussed by Duan et al. (2021). To provide personalized features effectively, orchestrators must balance individual customization with maintaining a cohesive design across the platform. This creates tension among stakeholders, as personalization challenges the standardization and regulations needed for a unified look. IP11 cited Meta’s AI builder as a notable example of addressing these challenges:

The amount that individualization and customization are wanted by the customers is extremely effortful. [...] There is now this AI builder by Meta. It’s a prototype based on voice recognition. So, Mark Zuckerberg is standing there [on the metaverse platform] as an avatar and says: ‘Hey, I need an island,’ and then an island appears. And then he says, ‘I want trees,’ and a palm tree appears. [...] And this is how you could build customized yet standardized objects for your customers in a few minutes.

Service quality marks the last dimension within the system creation phase. Here, aspects of *privacy and security* (IPs 1, 3, 6, 11, 12, 13, and 14) emerged as the focal platform characteristic. This focus stems from the unique types of data collected by metaverse platforms. With advancements enabling the collection of micro-movements and face-tracking data, organizations can now access unprecedented types of personal data. Aware of these risks, interviewees unanimously agreed that “if it [a metaverse platform] is not built safely, it won’t be successful” (IP 6). In other words, our interviewees require security and privacy concepts to develop a metaverse platform “into a safe space” (IP 13). Nevertheless, organizations often require sensitive data to effectively serve their customers. For instance, a hotel company testing its designs in the metaverse necessitates personal data on user movements within the platform. Consequently, organizations are concerned that customer reluctance to share data on metaverse platforms, coupled with their cautious approach to data collection, may restrict product sales (IPs 1 and 14). This creates tension between the need for privacy and safety versus the drive for product offerings and sales, often prioritizing the latter at the expense of the former. Therefore, striking the correct balance becomes crucial for complementors, given its significant influence on a platform's operational capabilities.

4.2 System Use: Usage Intention and User Satisfaction

Usage intention determines the target users of a platform and their manner of engagement. Naturally, organizations aim to reach their *target audience* upon entering a metaverse platform (IPs 1, 6, 10, 11, 12, and 14). IP 10 explains that large corporations might easily financially engage with any major platform, whereas small and medium enterprises (SMEs) must carefully choose platforms where their selected target audience is most active. For instance, while Roblox’s age demographic is age 13 to 25, the users of Meta’s Horizon are potentially older (IP 6). Additionally, complementors seek platforms with an *active user base* (IPs 3, 4, 6, 7, 8, 9, and 15). Platforms are appealing if “used by active users on a daily basis” (IP 4), as complementors aim to “engage and interact with users to enter a common dialogue and exchange” (IP 7). In other words, complementors view the metaverse as a venue for initiating interactions with current and potential customers. In this context, the metaverse acts as an additional channel for organizations to actively engage with their target audience (Hadi et al., 2023). Some companies aim to educate customers and create leads in the metaverse (IP 12), others focus on product-centric community creation to foster customer loyalty (IPs 3 and 6). This is consistent with the metaverse's focus on social interaction and immersion (Schöbel et al., 2023).

The user satisfaction dimension relates to the benefits users perceive from a platform. This perception shapes how users view the complementors on the platform. As a result, organizations favor platforms that cater to user needs. In this regard, the most critical platform characteristic concerns *usability and user experience* (IPs 1, 3, 4, 7, 8, 9, 10, 12, 13, and 14). This aspect is closely linked with system availability, a key part of the system quality dimension. It emphasizes a user-friendly experience throughout the application phase and the entire user journey (IP 7). IP 8 desires platforms that include “elements to positively surprise the user,” a point further elaborated by IP 4:

“Then another point would be the platform usage, this is all about how to access this platform and send the user out to discover the world and the many, many leads of the platform. How could we even make the consumer journey way easier to access the metaverse? [...] How could we make this [...] extend reality? How could we remove all the initial steps to make it like a natural, accessible environment?”

IP 4's concerns focus on how a metaverse platform's unique features are practically implemented. More specifically, metaverses are meant to extend reality by adding features for business and leisure (Bourlakis et al., 2009). For instance, making crypto wallet sign-up optional could increase platform accessibility. However, this could restrict the functionality of the platform's economic system, as seen in Decentraland's guest login feature. Therefore, platforms and complementors must find compromises to balance this tension.

Most interviewees agreed that a metaverse platform must offer added value to its users, essentially making it *useful* (IPs 1, 2, 3, 4, 6, 7, 8, 12, and 14). A metaverse platform “needs to provide an inherent added value to its users to convince [complementors] to have potential” (IP8). This implies that a metaverse platform must offer value to users even without the contributions of complementors. Here, value means any desirable outcome users perceive from using the platform. This challenges Bowman and Ambrosini (2000)' value theory that positions complementors as the exclusive source of use value in traditional ecosystems. Nonetheless, complementors prefer metaverse platforms that are already part of a functional, value-adding ecosystem (IPs 1, 4, 7, and 8).

The rationale behind these characteristics lies in the competitive dynamics of early-stage platform markets. IP 3 noted that platforms offering the highest perceived value will outlast others, becoming attractive investments for complementors. Although complementors are crucial to a digital platform's value proposition, they approach metaverse platforms with skepticism, demanding evidence of past performance. Complementors aim to minimize investment and

brand reputation risks by insisting on metaverse platforms demonstrating success (i.e., adding user value) before participating. Such requirements pose significant challenges for emerging platforms. Larger orchestrators like Meta (formerly Facebook) and Microsoft benefit from established credibility, whereas smaller, entrepreneurial platforms face stricter scrutiny, complicating the development of strong complementor ecosystems.

4.3 System Impact: Net Benefits

Net benefits describe the positive outcomes expected by complementors from their participation in a platform. Unlike previous dimensions, which focus on the metaverse's structure and customer relations, this dimension concentrates on the direct interaction between complementors and the platform. Foremost, complementors value *community building* (IPs 3, 4, 6, and 14). Our experts view the metaverse as enhancing bidirectional relationships between brands and communities, beyond what is typical on social media. IP3 highlighted this advantage, noting it “allowing our fans to give feedback to us.” More specifically, companies can nurture their communities while profiting from their responses. Product development is a field where this potential is already visible (see *customer engagement*). As an example, Starwood Hotels first constructed their properties in the metaverse world of “Second Life” (Gates (n.d.)). Subsequently, they invited customers to experience the space in 3D and offer feedback. Only after several iterations did Starwood begin real-world construction. Moreover, complementors can benefit from community building in various other use cases. For instance, the energy drink brand Prime engages its audience through the metaverse and NFTs (see *customer engagement*), fostering community feelings and boosting beverage consumption (see *increased sales*). Thus, community building serves as a steppingstone, not just an end goal. This aligns with previous studies on community building and social media (e.g., Guo et al., 2016; Sledgianowski & Kulviwat, 2008).

Brand building (IPs 3, 6, 7, 10, and 14) involves marketing activities with enduring effects. IP 14, among others, highlighted marketing as the most viable current business model outcome in the metaverse. Interviewees see metaverses as crucial for educating customers about a brand (IPs 3, 6, 7, 14). As with every online marketing, the metaverse can be used to engage customers with the core principles of one's brand (IP 14), to provide information and experiences about products (IPs 7 and 10), and to create strong emotional bonds, such as customer loyalty (IP 6). Yet, metaverses go beyond traditional functions by offering real-life brand experiences. For instance, in the metaverse, customers can test-drive a BMW (BMW, 2023), feel the difference of Nike shoes (Nike, 2023), or experience Givenchy's brand values

at a virtual pool party (Smith, 2022). Immersing users to the point where fiction and reality blur (Lee et al., 2022) allows for deeper and more impactful brand experiences (Hadi et al., 2023). Therefore, interviewees stressed the importance of a metaverse platform's brand-building tools in choosing the right metaverse.

Although many interviewees (IPs 1, 2, 3, 6, 7, 8, 10, and 15) mentioned *increased sales* as a significant platform benefit, it received the lowest ranking across all dimensions, falling into the 80th percentile. This finding was surprising, given the portrayal of the metaverse as a prime venue for trading, evidenced by trends in NFTs and virtual real estate. However, our interviewees either did not see its revenue potential (yet) or appreciated its other unique opportunities, disregarding financial benefit. For instance, IP3 asserted that “there is no revenue potential out of this [metaverse],” contrasting with IP2's statement that “we just don't want to burn money.” Ultimately, all interviewees agreed that sales increase was among the least important net benefits. However, metaverse usage becomes much more apparent when comparing the results of B2B companies to B2C companies. In our sample, all B2C interview partners used metaverse platforms for community or brand-building, indicating that consumer brands predominantly utilize these platforms to foster their existing assets (mainly customer base and brand equity). This emphasizes that, for these companies, the metaverse represents not a quick profit avenue but a long-term, sustainable investment. Conversely, B2B organizations show no clear tendencies. While five interviewees (IPs 6, 8, 11, 13, and 14) evaluated community and brand-building as the most important, two indicated reaching new customers and customer engagement as their highest priorities (IPs 3 and 2, respectively). However, none ranked increased sales first. This is in line with previous research on organizational value creation in metaverses. For instance, according to Schöbel and Tingelhoff (2023), organizations lack the foundational knowledge to understand a metaverse platform's opportunities and challenges, thus hindering efficient decision-making in the B2B sector. Alternatively, the diversity in organizational needs within the B2B sector might explain the varied preferences. Nonetheless, the unanimous lack of priority for increased sales in both B2B and B2C groups highlights the metaverse's broader benefits, offering extensive marketing and customer interaction possibilities beyond mere e-commerce.

5 Discussion of Results: Illustrating How to Transfer Platform Characteristics

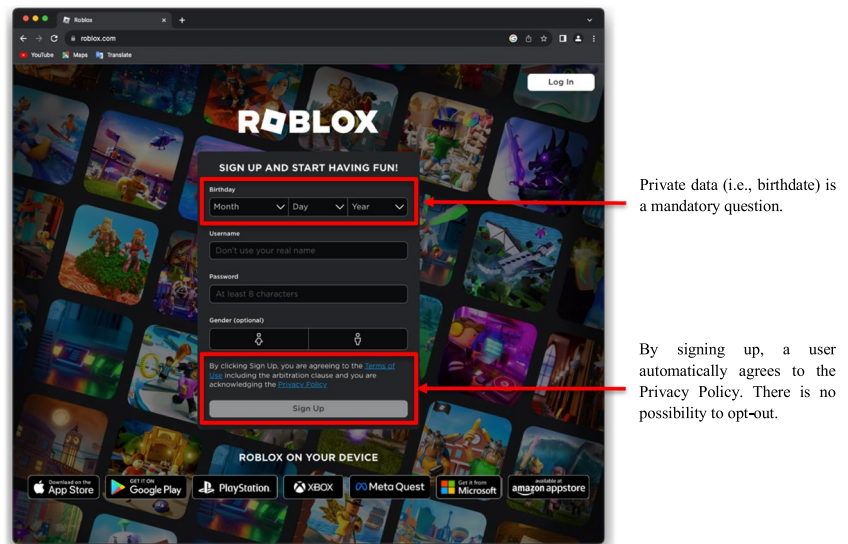
Building on earlier discussions about crucial metaverse platform characteristics for complementors, certain orchestrators are now incorporating features that align with these

metaverse attributes. Decentraland and Roblox are two leading examples of early metaverse platforms. With 42 million daily active users globally, Roblox stands as one of the most popular metaverse platforms (Gollmer, 2022). Conversely, Decentraland has approximately 8,000 daily users, according to internal Decentraland Foundation data (Decentraland, 2022). Despite smaller user numbers, Decentraland remains a leading name among decentralized metaverse platforms (Brooke, 2022). Furthermore, Decentraland (IPs 2, 3, 4, 6, 7, 8, 9, and 15) and Roblox (IPs 3, 4, 6, and 13) were the most frequently mentioned metaverse platforms by our interviewees, referencing these platforms continuously as metaverse examples.

Studies indicate that both platforms possess the technological capabilities essential for metaverse classification, such as immersion or creator economy aspects (Schöbel et al., 2023). For instance, Decentraland encourages creativity by allowing users to own and develop land parcels. Each platform offers a comprehensive visualization of its virtual world. Collaborating with these platforms allows organizations to bypass the need for hiring game designers or creating immersive worlds from scratch. Thus, both platforms serve as accessible entry points into the metaverse. The key distinction lies in Roblox's centralized structure versus Decentraland's decentralized governance. The Roblox Corporation, a US-based public software company, controls significant updates to Roblox. In contrast, Decentraland operates as a DAO, where ownership and decision-making powers are distributed among users and complementors via the virtual currency, MANA. This model enables stakeholders to vote on governance issues and how the treasury is allocated (Brooke, 2022). We will use these two platforms as practical examples to illustrate our interview findings.

5.1 Illustration of System Creation

Both platforms' user experiences are quite diverging. Roblox stands out for its *accessibility*, supporting web browsers, mobile devices, and Xbox consoles, aligning with our interviewees' preferences. Additionally, Roblox offers both 2D and immersive 3D experiences via virtual reality (VR) headsets. Despite its maturity, Roblox has yet to incorporate augmented reality (AR) technology (Shin, 2022; Yang et al., 2022a, b). Metaverses aim to blend virtual and physical realities, enabling seamless information exchange between the two (Marabelli & Newell, 2022). AR offers significant advantages by overlaying virtual content onto the real world, intertwining both realities. Body sensors can further enhance user immersion by integrating physical movements into the virtual experience (Park & Kim, 2022). Despite our interviewees' emphasis on accessibility, metaverse platforms infrequently implement these immersive features (Park & Kim, 2022).

Fig. 3 Roblox's Web Access

Although Roblox boasts an open and accessible design, it restricts users with a compulsory sign-in process that demands personal information, including date of birth. Additionally, signing in necessitates users' acceptance of Roblox's terms of use and privacy policy. This requirement raises *privacy and security* concerns due to the submission of private data for platform access (IP 1, 3, 6, 11, 12, 13, and 14). Past research highlights the critical role of data security measures like privacy guidelines, stressing the need for user empowerment in decisions regarding data collection and storage (Guidi & Michienzi, 2022; Ning et al., 2021). Figure 3 shows Roblox's access page.

Decentraland features a distinct economic system, a priority reflected in its user account setup. Unlike other platforms, Decentraland registration requires a third-party crypto wallet, such as MetaMask, instead of a platform-specific account. This shows that Decentraland, unlike Roblox, is not interested in being the proprietor of its users' data. A crypto wallet is essential for owning and trading virtual goods and currencies, a fundamental aspect of metaverse platforms (Di Pietro & Cresci, 2021; Oliver et al., 2010; Tayal et al., 2022; Vidal-Tomás, 2022). Using a crypto wallets as accounts, Decentraland's users can execute peer-to-peer economic transactions without intermediaries. This aligns with our interview results, where interviewees highlighted the need for integrated payment systems (IP 12) as enabler for unique user experiences (IP 15).

User-generated content (UGC) is a defining characteristic of metaverse platforms. UGC empowers users to enrich the platform with their creations, ranging from services and products to various content. While some researchers argue that all content must be user-generated in a metaverse (Ayiter, 2012), others believe metaverses should primarily enable user creativity (Dionisio et al., 2013) to facilitate

UGC (Oliver et al., 2010). For instance, Roblox incorporates gaming elements (Getchell et al., 2010) and actively supports users in crafting their games from the ground up (Metcalf, 2022). The Roblox engine allows users to seamlessly transition between diverse game genres, like puzzles and sports —this is, in part, related to the metaverse vision of persistency and interoperability between different platforms. Additionally, Roblox offers resources for users to learn programming, further empowering them to design their games. Roblox's open creation platform has led to the development of over 32 million unique virtual experiences, indicating its focus on *freedom of creativity*. Greater creative freedom for content creators fosters more innovation in the design of experiences (Orgaz et al., 2012).

Similarly, creativity extends to the creation and sale of digital goods (Boughzala et al., 2012; Kim, 2021). Roblox, along with its users and complementors, can create and sell these digital items. Roblox thus empowers its users to transact and monetize their content, a vital characteristic of metaverse platforms (Popescu et al., 2022; Tayal et al., 2022). Yet, Roblox conducts all transactions with its proprietary currency, Robux, which can be purchased via the platform using traditional payment methods, such as credit cards. Studies indicate that transactions in FIAT currency benefit users by eliminating currency conversion and lock-in mechanisms (Gadalla et al., 2013; Hwang & Lee, 2022; Papagiannidis et al., 2008; Vidal-Tomás, 2022; Yang et al., 2022a, b). Despite the emphasized importance of *interoperability* by research (Di Pietro & Cresci, 2021; Kim, 2021) and our interviewees (IPs 1, 7, and 14), Roblox lacks this feature. Although purchases on Roblox are persistent (Braud et al., 2021; Falchuk et al., 2018), they are not transferable to other platforms (Wang et al., 2021). Figure 4 shows the Roblox Avatar shop.

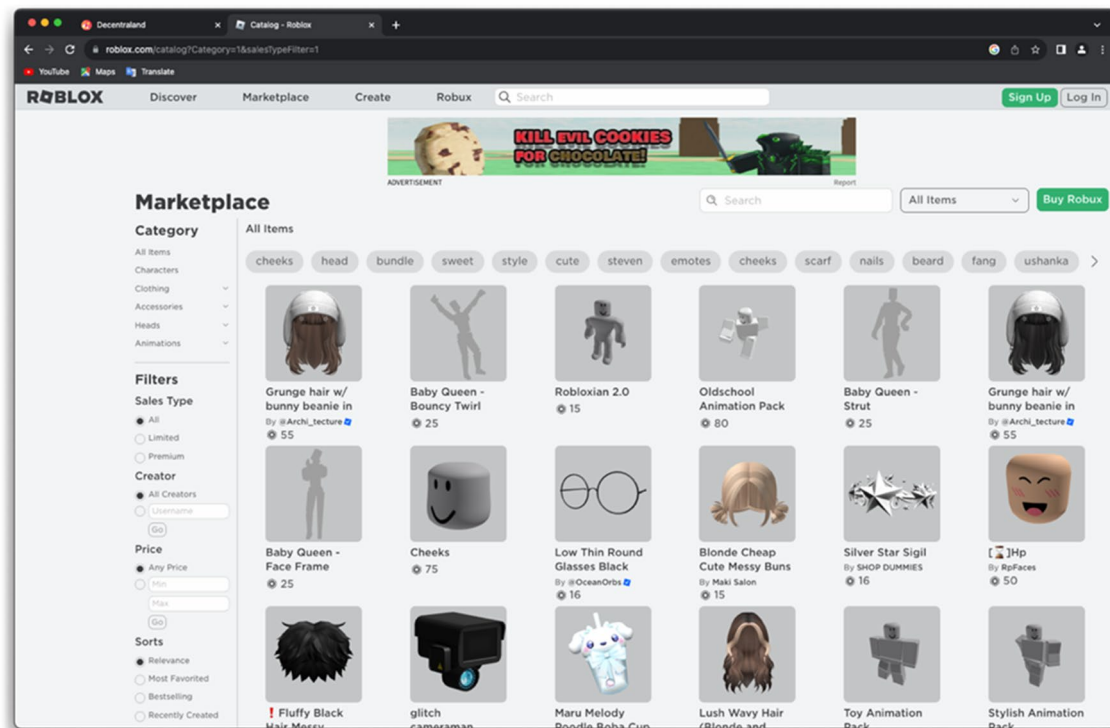


Fig. 4 Roblox's Avatar Shop

Decentraland also prioritizes *personalization*. For instance, the platform offers extensive character customization options available even to guest users. Beyond many free features, Decentraland also offers paid personalization options, such as skins or collectibles. This is an essential feature of metaverse platforms, as scholars agree on the importance of designing avatars resembling the actual appearance of the user (e.g., Dionisio et al., 2013; Gadalla et al., 2013; Hwang & Lee, 2022; Shin, 2022). However, some researchers describe real-time 3D scans as the pinnacle of avatar customization (Schöbel et al., 2023). Photorealistic depictions of users offer significant advantages. This approach mitigates safety concerns related to anonymity and potential irresponsible behavior in virtual spaces (Falchuk et al., 2018; Guidi & Michienzi, 2022; Sykownik et al., 2022). Yet, achieving photorealism introduces several technological challenges. Implementing face scans requires infrastructure like depth sensors, while photorealistic rendering demands high computing power and significant data storage, both of which are already current bottlenecks in expanding virtual worlds. Decentraland's approach to character customization, depicted in Fig. 5, strikes a balance between photorealism and anonymized character appearances.

Transitioning between locations on both metaverse platforms resulted in significant loading times. During our Decentraland test, specifically when creating the character, the platform crashed, erasing all progress (see Fig. 6).

While *platform stability* was mentioned by almost every interviewee (IPs 2, 3, 4, 6, 7, 9, 11, 12, 14, and 15), it cannot always be guaranteed. These issues stem largely from the high demands for computational power and data transfer (Choi & Kim, 2017). The integration of technologies like VR, decentralized ledgers, photorealism, and platform interconnectivity means metaverses will eventually generate more data than current storage capacities can handle (Schöbel et al., 2023). Therefore, "hosting and handling a metaverse platform will require significantly more effort than organizing traditional two-sided market platforms" (Schöbel et al., 2023, p. 8). These challenges can already be observed in the platforms' governing decisions. To manage computational and data-sharing loads, both platforms cap the number of users per server, as computational power, rendering, and data traffic requirements increase exponentially with each additional user. Imposing these limitations, however, contradicts fundamental metaverse principles like unrestricted user movement (Jaynes et al., 2003; Owens et al., 2011) and independence (Davis et al., 2009; Khansulivong et al., 2022). Further, social interactions are a cornerstone of the metaverse concept (Davis et al., 2009; Wang et al., 2021). The present state of technology and governance in metaverse platforms indicates that a fully realized metaverse remains a distant goal (Peukert et al., 2022; Schöbel et al., 2023).

Fig. 5 Decentraland's Character Customization Page

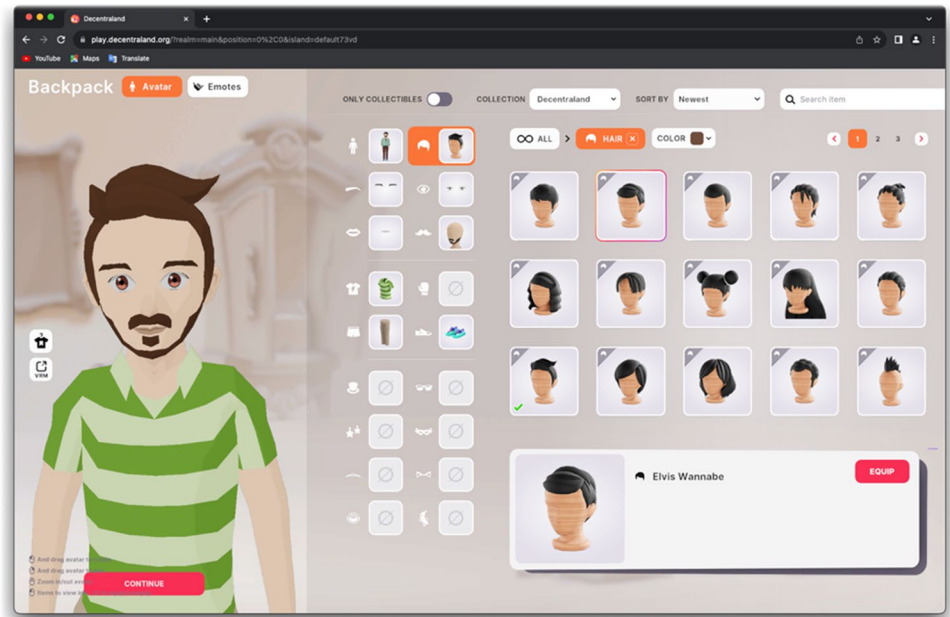
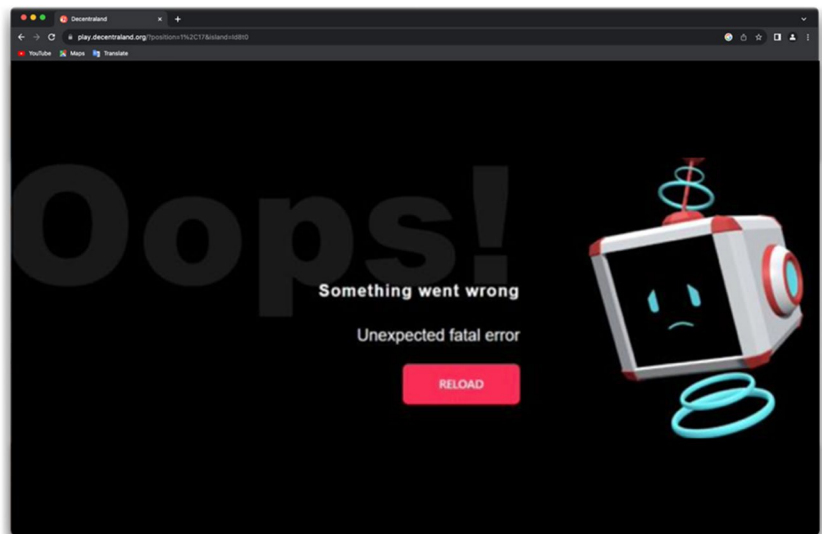


Fig. 6 Error Message while using Decentraland



5.2 Illustration of System Usage

Past research has identified *trust* as a critical component for the functionality of an ecosystem (Lang et al., 2019; Tawaststjerna & Olander, 2021). Stakeholders rely on trustful interactions among ecosystem actors, particularly in e-commerce and social media platforms (Bonina & Eaton, 2020). E-commerce platforms serve as centers for financial transactions. Customers and complementors must trust these platforms to accurately and error-free conduct their transactions. Given that many transactions on these platforms are one-time events, complementors face challenges in building trust through rapport with customers. Hence, e-commerce platforms (such as Amazon) act as trusted intermediaries

(Friedrich et al., 2019; Molla & Licker, 2001; Torkzadeh & Dhillon, 2002). Users prepay for products, trusting in timely delivery, whereas complementors trust the platform to compensate them for sales. Thus, trust among its actors is essential for an e-commerce platform's proper function (Friedrich et al., 2019). Similarly, social media platforms manage valuable data. Unlike e-commerce platforms, social media platforms facilitate the sharing of personal information, like preferences and opinions, rather than financial transactions. On social media, users express their identities by customizing profiles, engaging with content, and sharing their posts (Krasnova et al., 2017; Lin & Lu, 2011). The importance of trust in social media was underscored when Twitter sold verification checkmarks without vetting accounts. As users

Fig. 7 Playing games in Nike-land, Nike's virtual world on the Roblox platform



trusted the check would verify an individual's or company's authenticity, many took announcements from fake accounts as serious news. This led to global stock market turmoil, with some companies losing billions in market value due to misinformation (Mac et al., 2022). Experts concluded that Twitter, as an information mediator, “undermine[s] the original purpose [...] – to help users know they can trust information being shared” (Duffy, 2022). This instance highlights the crucial need for trust within social media ecosystems (Sledgianowski & Kulviwat, 2008).

The metaverse stands out as a platform that integrates functionalities from e-commerce, social media, collaboration, and education into a single environment (Tingelhoff et al., 2024). Consequently, it is designed to support both financial transactions and the exchange of private information. Therefore, trust may play an even more critical role for ecosystem actors in the metaverse than in other digital environments (Badrudodoja et al., 2022; Wang et al., 2022). Existing research consistently demonstrates how *user experience* influences trust in digital ecosystems (Seckler et al., 2015) and automated systems (Yang et al., 2017).

At its heart, the metaverse is focused on delivering a distinctive user experience (Tingelhoff et al., 2024). Immersion and automation technologies make user experience even more crucial in the metaverse compared to other digital platforms. Our interview partners mirrored this. For instance, IP4 emphasized the importance of removing obstacles to enhance the accessibility and enjoyment of the virtual world. Moreover, IP9 identified user experience as essential for the success of both the platform and its complementors. IP8 summarized: “The deciding factor is clearly customer experience, meaning that a user can develop a positive feeling on the metaverse platform and then leave it with a smile on their face.” This can be further supported by anecdotal evidence from our research team. When the previously described error message occurred while testing Decentraland (see Fig. 6), our first author exclaimed: “If the platform isn't stable enough to create an avatar, how can I trust it with my financial transactions?”.

5.3 Illustration of System Impact

Given the vast range of integration options Roblox and Decentraland provide for complementors, their business models and resulting net benefits can significantly vary. Even within a single platform, complementors often pursue varied objectives through their participation. For instance, Adidas launched an NFT collection to potentially attract *new customers* and *boost sales* (Bain, 2023), whereas Nike concentrated on *brand building*. On Roblox, Nike created Nikeland, a virtual world where users engage in games themed around Nike shoes and interact with one another. Players navigate the map using features like sprinting or hoverboards, underscoring sportiness and innovation—qualities Nike aims to embody (Marr, 2022).

Nike additionally focuses on *community building*. Specifically, it nurtures a sense of community by blending collaborative and competitive dynamics. Competitive features are key in metaverses, engaging users, encouraging social interaction, and presenting challenges to tackle (Martins et al., 2022; Quintín et al., 2016). Nikeland features a leaderboard, allowing users to continuously compare achievements with peers. Users can also team up for challenges, promoting user collaboration (Martins et al., 2022). These game elements are proven to influence brand image within the metaverse (Oliver et al., 2010).

Beyond subconsciously building brand associations (Kim et al., 2022; Wagner et al., 2009), Nike actively educates customers on its brand values during gameplay. According to our interviewees (e.g., IP 12) and existing research (e.g., Tingelhoff et al., 2024), metaverse platforms deeply engage and educate customers through immersive content (Lee et al., 2022). Specifically, in Nikeland, the content is centered on Nike-related content. For instance, players interact with a guide named “Nike Coach.” Wearing a Nike shirt, the coach is presented as an authority on health and sports. The coach assigns quests and offers advice on increasing physical activity. Through this, Nike seeks to solidify its reputation as a sports authority. Additionally, the coach explicitly conveys

Nike's values and goals, educating customers. Experts (Hazan et al., 2022) and researchers (Dwivedi et al., 2022) have underscored the metaverse's unique ability to blend gaming with e-commerce in that manner. Figure 7 depicts a screenshot of Nikeland with the previously discussed elements highlighted.

We caution against assuming that the net benefits for complementors can be definitively assessed from an external perspective. Nevertheless, Decentraland and Roblox demonstrate consideration for several identified characteristics conducive to complementors' value creation. Both platforms also exhibit limitations within certain dimensions, which, from our observation, detract from their overall performance. This may stem from the platforms' evolving nature, underscoring the imperative for ongoing enhancement. Moreover, the presence of the variables from our analysis in both platforms is irrespective of their *governance structure*. This reinforces the view that the organizational structure of a metaverse platform is not the primary distinguishing factor for complementors. Our interview findings, illustrated in Fig. 2, support this observation.

6 Contributions and Implications

Our study offers several contributions to researchers and practitioners. Theoretically, our study enriches understanding of ecosystem dynamics in metaverse platforms. Specifically, we explored the role and relationships of complementors within metaverse platforms. We applied the D&M IS success model, a well-established framework, to examine the platform-business model fit across different contexts. From its six dimensions, we pinpointed 26 characteristics specific to metaverse platforms. These characteristics significantly impact complementors' value creation in metaverse environments. They progress the conceptualization of the metaverse's capabilities and the tensions with which complementors must deal within the metaverse ecosystem. Consequently, our study encourages researchers to explore the metaverse's nature, meaning, and ecosystem players further.

From a practitioner's perspective, our study guides both orchestrators and complementors. For metaverse decision-makers, our findings highlight essential platform characteristics vital for effective value creation. This understanding can lead to complementors aligning with platforms that resonate with their business models and, conversely, enable orchestrators to refine their platforms to support organizational value creation better. The implications are dual: improving the alignment between business models and platforms, and fostering platform evolution to better facilitate value creation. Ultimately, these insights could promote stronger business cases in metaverse platforms, accelerating adoption among businesses and consumers.

7 Limitations and Future Research

Our study's limitations provide grounds for future research. First, a consensus on defining the metaverse remains elusive. While conceptual papers discuss the metaverse's nature (e.g., Hadi et al., 2023), others like Peukert et al. (2022) highlight its ongoing evolution, complicating its definition. While this study aims to contribute to the technological design choices during its development, we also want to highlight the need to replicate our findings in the future to determine their validity over time. Second, our sample spanned experts from the B2B and B2C contexts and several industries, resulting in a reasonably general framework. Future research could replicate this study with industry-specific experts to explore how metaverse applications can be customized to meet distinct industry needs. Third, most of our interviewees were from Europe, with only one from Hong Kong and another from the USA. Therefore, cultural differences might yield varied findings. Given the concentration of metaverse developments in North America and Asia, conducting studies in these regions could uncover additional insights. Finally, our interviewees worked at companies already involved in metaverses or actively considering them, which could have biased our results. Future research should engage experts holding critical views on the metaverse to contrast their perspectives with our findings.

8 Conclusion

This study aimed to highlight key characteristics of metaverse platforms crucial for complementors seeking to maximize their value creation. Our research draws on platform ecosystem and value creation theories to provide a foundational understanding of how complementors generate value on metaverse platforms. We interviewed 15 metaverse decision-makers across various organizations, identifying 26 characteristics of metaverse platforms that impact complementors' ability to create value. We structured these characteristics according to the six dimensions of the DeLone and McLean IS success model and exemplified them through Decentraland and Roblox.

The journey to fully comprehend metaverse platforms is ongoing. This study clarifies the design characteristics of metaverse platforms and introduces a framework to aid complementors in choosing suitable platforms. Additionally, it empowers researchers and practitioners to design new metaverse platforms purposefully. Ultimately, our research seeks to lay the groundwork for future inquiries in this domain.

Appendix

Table 1 Demographic Data of Interview Partners

IP	Name	Position	Company	B2B/B2C	Country	Length
1	Beat Aebi	Chief Marketing Officer (CMO)	Geberit	both	CHE	38 min
2	Daniel Rutishauser	Partner, Head of Blockchain Services	Inacta	B2B	CHE	26 min
3	Davide Sgherri	Head of New Media & Metaverse	Dolce Gabbana	B2C	ITA	28 min
4	Federico Russo	Global Junior Brand Manager	Unilever	B2C	NLD	30 min
5	Hans Neubert	Digital Brand Manager	L'Oréal	B2C	DEU	33 min
6	Ian Savage	Chief Creative Officer	Playcrafting	B2B	USA	36 min
7	Janine Hartl	Campaign & Digital Marketing Manager	Vienna Touristboard	B2C	AUT	27 min
8	Jürg Kobel	Web3 & Metaverse Consultant	Kuble	B2B	CHE	26 min
9	Luca Arrigo	Co-Founder	Metaverse Architects	B2B	MLT	36 min
10	Thomas Hermann	Business Group Manager DELL Technologies	Ingram Micro	B2B	CHE	31 min
11	Tobias Kunz	Senior Product Manager Tech	Future Candy	B2B	DEU	40 min
12	Ursin Maissen	Director (CEO)	Pontresina Tourism	B2C	CHE	32 min
13	Viktoria Domeier	Senior Producer	OneTwoSocial	B2B	DEU	28 min
14	William Gee	Adviser	PwC Hong Kong	B2B	HKG	56 min
15	Yered Peronnet	Metaverse Officer	EverdreamSoft	B2B	CHE	39 min

Acknowledgements For this research, Fabian Tingelhoff received funding from the Konrad-Adenauer-Foundation (KAS).

Funding Open access funding provided by University of St.Gallen.

Data Availability All data supporting the findings of this study are available within the paper and its Appendix. Any further data are available from the corresponding author upon reasonable request.

Declarations

Conflict of Interest The authors declare that they had no conflict of interest when constructing this manuscript.

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Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

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