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Overcoming Challenges to Enable the Potential of Metaverse Platforms: A Qualitative Approach to Understand Value Creation

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Abstract:

Metaverse is the buzzword of modern society. Practitioners and researchers have discussed metaverse platforms extensively, but the potential and meaning of the metaverse remain controversial. In this paper, we investigate and identify challenges that enable the potential of metaverse platforms. If these challenges are overcome, there will be value creation for practitioners, organizations, and society. We used a qualitative approach whereby we interviewed 34 metaverse experts to identify the challenges, potential, and value associated with the metaverse. Our results demonstrate that technical and societal challenges obstruct the ability to handle user-related and organizational challenges. If these challenges can be overcome, we can use the opportunities that our participants identified to create functional, social, and emotional value. Our work theoretically contributes to current knowledge on metaverse platforms by elaborating on handling metaverse platform ecosystems and determining instrumental challenges in their realization. With our qualitative approach, we provide room and directions for future research to develop a better understanding of the role and meaning of value creation in the metaverse. Our findings are useful to practitioners by presenting challenges organizations must overcome to create metaverse platforms or participate in a metaverse ecosystem. Furthermore, we present opportunities for vendors of metaverse platforms and organizations by identifying relevant processes that can be transferred into the metaverse.

Keywords: Metaverse Platform Ecosystems, Challenges, Opportunities, Value Creation.

Fiona Nah was the accepting senior editor for this paper.

1 Introduction

Since the Internet emerged, virtual places in cyberspace have become an extension of our physical world. Simultaneously, the way we communicate in virtual spaces has shifted towards involving more interactions (Moneta, 2020). As a result, the Internet has instrumentally evolved from a network to exchange information into a meeting space that empowers people to transact items of value with one another (Tapscott & Tapscott, 2017). As we can see through investments, companies have already begun preparing for this next Internet phase (Dolata & Schwabe, 2023). For example, Meta (formerly Facebook) purchased the manufacturer Oculus to integrate its virtual reality (VR) and augmented reality (AR) technologies and, thus, provide a new customer experience (Law et al., 2009). Furthermore, Microsoft recently acquired Activision, among the biggest online gaming developers, to incorporate the latter's interactive imaging technologies into its version of the Internet's next generation. These market movements have initiated and continued a trend around a new phenomenon called "the metaverse" (Dolata & Schwabe, 2023).

The metaverse originated from Neal Stephenson's novel *Snow Crash* (Stephenson, 1992). Etymologically, the term comprises the word "meta" (meaning beyond) and the stem "verse" from the universe (Dionisio et al., 2013). Consequently, it denotes next-generation Internet platforms in which users, represented by avatars, interact with each other and the software applications in a three-dimensional (3D) virtual space (Duan et al., 2021). While metaverse platforms remained a purely fictitious idea in 1992, technology has increasingly begun to enable their application. Therefore, metaverse concepts constantly adapt over time to incorporate those developments (Peukert et al., 2022). Building on this argument, a metaverse incorporates and combines several technologies to enable new unique capabilities. Blended technologies such as self-sovereign and interoperable identity, virtual and extended reality, and decentralized ledger technologies have contributed to making metaverse platforms support an economy and society in parallel with real life. We have not previously seen such combinations in any other virtual environment (Wang et al., 2021). Consequently, the metaverse exceeds a VR or AR solution as it changes our perspective on designing and managing digital technologies. Likewise, metaverses transcend the tool metaphor from the information technology domain by modeling the real world and focusing on supporting users as actors (Davis et al., 2009; Sotto, 1997).

Despite the metaverse's growing presence in our society and economy, both academia and practitioners have not agreed on how to fully realize its potential (Park & Kim, 2022). While research firms such as Gartner or McKinsey have forecast the metaverse to represent a trillion-dollar revenue opportunity (Gartner, 2022; McKinsey, 2022), others remain doubtful: researchers and journalists likewise question whether one can successfully realize metaverse platforms (Isaac, 2022; Stokel-Walker, 2021) and their appeal (Falchuk et al., 2018). Despite the potentially desirable changes that metaverse platforms could initiate, JP Morgan emphasizes that "metaverses will likely infiltrate every sector in some way in the coming years" (Moy & Gadgil, 2022, p. 2).

To help researchers and practitioners realize metaverse platforms' potential, we first must identify and understand existing challenges that obstruct their materialization (Nickerson et al., 2022). In doing so, one can conceptualize value creation in a metaverse platform (Marabelli & Newell, 2022) and, in turn, guide practitioners in adjusting their platforms to complement the metaverse concept. Hence, research needs to explore the challenges and potential of metaverse platforms in organizational settings to advance knowledge of the metaverse's nature and logic (Torraco, 2005).

Therefore, in this study, we focus on identifying challenges we need to overcome to create value in metaverse platforms. Accordingly, we derive the following research questions (RQs):

RQ1: What challenges do we need to overcome to realize metaverse platforms?

RQ2: Which opportunities exist from realizing metaverse platforms?

RQ3: Which value can we generate from metaverse platforms if we overcome existing challenges?

We used a qualitative approach to answer our research questions. We interviewed 34 experts and inductively identified challenges, opportunities, and factors to create value with metaverse platforms (Gioia et al., 2013). As a result, we contribute to theory by overviewing existing challenges from different perspectives, such as users, organizations, and society, and, hence, expand knowledge around the nature of the metaverse. We clarify how metaverse platforms can create value and support practitioners by uncovering central obstructions in realizing metaverse platforms and their potential.

This paper proceeds as follows: In Section 2, we portray the metaverse's development, specific platforms, and integrated roles. In Section 3, we describe the methodology we followed to conduct our study. In Section 4, we present our results before discussing them in Section 5. In Section 6, we debate future research directions and the paper's limitations. Finally, in Section 7, we conclude the paper.

2 Theoretical Background

2.1 The Emergence of the Metaverse

The concept behind the metaverse surfaced fairly recently. We summarize historical developments in the metaverse area in Figure 1. The idea behind the metaverse originated in Neal Stephenson's novel *Snow Crash* published in 1992. It described a virtual world that immersed people in expanding their physical reality. Hence, a metaverse platform refers to a Web-based solution. Unsurprisingly, many scholars and practitioners have declared the metaverse as the next generation of the Internet (e.g., Gollmer, 2022). We can divide the Internet into three evolutionary stages:

1) Web 1.0: a static and one-directional information flow (e.g., webpages).
2) Web 2.0: information and knowledge exchange with one another via interactive Web elements (e.g., online forums).
3) Web 3.0: Internet services that empower people to exchange value items directly (Tapscott & Tapscott, 2017). Grounded on a machine learning approach, it provides a data-driven and semantic Web (Gogoulos et al., 2014) that shapes how to handle and manage metaverse data (Das, 2020).

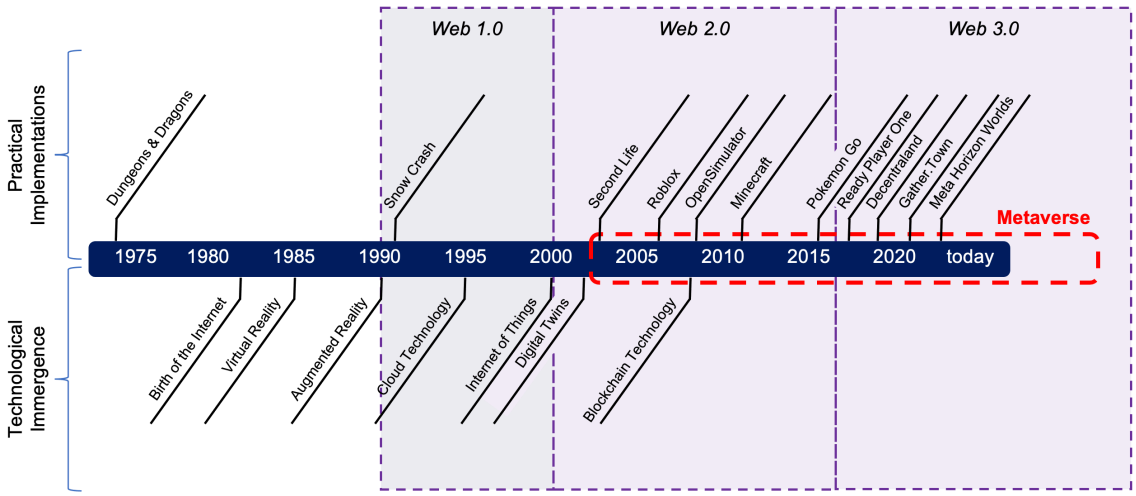

Figure 1. Overview of the Historical Development and Background of the Metaverse

Through its technological core, a metaverse provides value to users in many contexts such as work, education, e-commerce, or leisure (Di Pietro & Cresci, 2021). Following the Web 3.0 perspective, the metaverse foremost constitutes an online marketplace. In such a marketplace, it is possible to realize a unidimensional transaction of goods via deterministic legal possessions, which are based on technologies such as non-fungible tokens (NFTs) (Vidal-Tomás, 2022). NFTs belong to a blockchain and cannot be replicated, which makes them especially relevant for artists or creators to secure the originality of their digital work. For example, one can couple a good purchased virtually with the same physical good (e.g., sneakers for a user and their avatar). Then, one can interlink virtual and physical goods so that using a product in the real world leads to alterations in the virtual world. Besides e-commerce, gaming has also inspired metaverse platform designs (Wiethof et al., 2021). Games such as Dungeons and Dragons, Second Life, and Pokémon Go have pioneered metaverse platforms. Lastly, based on how the Web 2.0 participatory Internet has evolved, the metaverse and social media sites share many features (Mojdeh et al., 2018). The metaverse can connect individuals to an online social system and facilitates immersion in their online representation and identity (Mairinger, 2008).

Discussions about the metaverse platform and its realization have emerged in part due to new infrastructural possibilities, such as blockchain technology (Sunyaev, 2020); new ways to interact with technology and others, such as AR/VR (Barry et al., 2015) and digital twins (Liu et al.., 2021); and new ecosystems, such as artificial intelligence (AI) (Lisetti & Schiano, 2000; Paul et al., 2022) and user-generated content (Krumm et al., 2008).

2.2 The Metaverse: A Platform Ecosystem to Create Value

We categorize the metaverse as a platform ecosystem that hosts several different platforms, which makes the metaverse an organization of organizations (Kretschmer et al., 2022). To better describe this idea, we roughly present a metaverse platform ecosystem's general structure. Generally, the metaverse connects the virtual with the real (physical) world (Park & Kim, 2022). We can understand the resulting intersection as a kind of meta-ecosystem that hosts and connects many different platforms to create a metaverse experience. The metaverse combines several digital ecosystems, each with its own universe that connects actors with different roles such as complementors and platform owners (Nickerson et al., 2022). We visualize the ecosystem in Figure 2.

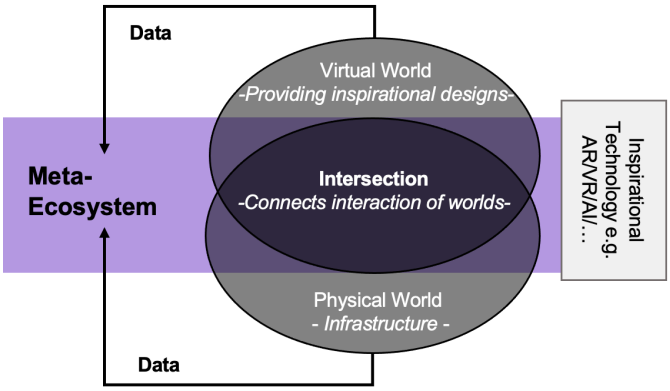

Figure 2. Connection between the Physical and Virtual World of Meta Ecosystems (based on Duan et al., 2021)

Metaverse platform ecosystems typically feature interoperable, cross-platform persistence; that is, they allow individuals to overcome specific boundaries and freely move across platforms. This is often referred to as interoperable, cross-platform persistence. Interoperability and persistency are two characteristics of the metaverse that enable individuals to switch and transfer their properties between platforms without restrictions.

To bring these ecosystems to life and for them to create and generate value, users need to perceive them as attractive. Thus, in this study, we also focus on value. Value refers to an individual's overall utility assessment based on how they perceive input and output (Zeithaml, 1988). We can classify value output into three dimensions: emotional, functional, and social value (Sweeney & Soutar, 2001). Emotional value describes positive feelings and individual experiences, social value describes individuals' social self-concept, and functional value describes performance quality. Research has established links between these values and users' willingness to participate in and recommend specific platforms (e.g., Oyedele & Simpson, 2018; Zhu & Iansiti, 2012).

3 Methodology

Metaverse platforms remain nascent, and some researchers even question whether current platforms already qualify as a metaverse (Peukert et al., 2022), which has impeded researchers and practitioners from adopting quantitative research approaches to examine such platforms. Still, researchers and practitioners have studied the metaverse with great interest. Therefore, we relied on 34 expert interviews with experienced scholars and industry decision-makers in the metaverse domain. We recruited most participants via LinkedIn. In more detail, we recruited around 10 participants via a LinkedIn post and the others based on referrals from these participants. We opted to follow a qualitative research approach based on a call from Corley and Gioia (2011) for more useful research for practice and theory. Accordingly, following Gioia et al. (2013), we employed semi-structured interviews and coded our results to interpret each

interviewee's opinion on the metaverse. We used open and semi-structured interviews to provide enough space for the experts' experiences to unfold based on their ideas on the metaverse.

3.1 The Relevance of Qualitative Research

Qualitative research originated in anthropology and sociology over a century ago. To this day, it continues to evolve, and its scope expands as researchers develop new methods. While researchers in the social sciences still primarily apply qualitative research, we can observe a trend in digital and social media research to increasingly use it as well (Merriam & Grenier, 2019). Qualitative research explores the motivation behind any kind of behavior or, in our context, information on challenges that need to be mastered to realize the opportunities of the metaverse to create value for individuals and organizations. For our study, we employed an interpretive and social constructivist perspective (Corley & Gioia, 2011).

Lincoln and Guba (1985) suggest considering several factors to ensure validity and reliability: credibility, transferability, dependability, and confirmability. Credibility refers to the extent to which a researcher's findings concur with reality (Lincoln & Guba, 1985). Thus, we treat our informants as "knowledgeable experts" (Gioia et al., 2013, p. 16). To ensure our participants' credibility, we chose experts with either industry experience or research experience in metaverse platforms. Metaverse experts from academia had to possess experience with related projects using AR, VR, or games. To ensure credibility and intercoder reliability, we critically discussed the initial coding results. We repeated this process until all coders could ensure that first-order codes had a comparable abstraction level and reflected each informant's experience.

Transferability reflects whether one can transfer the results from one study to a different setting with different interviewees. We agree with Gioia et al. (2013) that qualitative inductive research can produce structurally transferable insights. To improve transferability, we provide additional context information on each informant to the best of our abilities (see Appendix 1). In our study, we had participants from different contexts, with different educational backgrounds, and at different ages. Dependability or reliability describes the extent to which others can replicate research findings (Merriam & Grenier, 2019). We noticed high concept/coding saturation after the 10th interview. We observed no gender-related discrepancies, which we controlled by adding four additional interviews with females to our original number of 30 interviews with no major changes to our codes.

Confirmability deals with objectivity (i.e., researcher bias and its effect on a study's outcomes). Ideally, researchers should be objective and factual. Since researchers cannot feasibly be so (especially under the constructionist view), we (i.e., all researchers) at least recognized our potential biases, which we critically and proactively addressed during the analysis phase. Additionally, both authors conducted the interviews to further prohibit these biases. Thus, our research design has its roots in the grounded theory methodology (Gioia et al., 2013). In Section 3.2, we provide additional information on our data collection and analysis.

3.2 Data Collection and Analysis

We conducted interviews with 34 experts (whom we refer to as interview partners (IP 1 to 34)). We recruited most participants via LinkedIn. In more detail, we recruited 10 participants via a LinkedIn post, while the others resulted from referrals from those initial 10 interviewees. Among the academic interview partners in our sample, we analyzed their publications to identify which ones had expertise with or knowledge about the metaverse. We then conducted interviews online that lasted between 24 minutes and 51 minutes. On average, our participants were 36 years old. We interviewed nine females and 25 males. Each participant had a different work position. We provide an overview in Appendix A.

We used a semi-structured interview approach and guidelines. First, we asked participants about their backgrounds and demographics and included general questions about the metaverse such as asking our participants to define the metaverse. Second, we asked them about challenges associated with the metaverse. Subsequently, we addressed opportunities and value potential. Ultimately, we asked our participants their opinions on the metaverse's future development. We overview all questions in Appendix B.

We conducted all interviews via Zoom, Skype, and Microsoft Teams. Researchers have not commonly used online video interviews to collect data in the past, which we can attribute to the method's relative novelty (Lo Iacono et al., 2016). However, especially during the coronavirus disease of 2019 (COVID) pandemic, more researchers adopted this approach. Modell et al. (2017) emphasize that this sourcing method can prove especially useful for reducing bias during interviews. For instance, interviewers can easily bias a semi-

structured interview based on how they frame questions, when they ask follow-up questions, and even their mere presence (Valenzuela & Shrivastava, 2002). However, one can mitigate such bias via conducting interviews online as participants can be more "themselves" using this method due to feeling more comfortable (Lo Iacono et al., 2016) as they can freely choose how and where to sit or to walk around without disturbing others or setting a tense atmosphere. Nevertheless, the technique has downsides. First, we could observe non-verbal expressions, mainly intonation and gesture (Bertrand & Bourdeau, 2010), only to a limited extent. Second, King et al. (2018) warned against technical issues during calls that can interrupt voice and video transmissions. Nevertheless, we decided to use this approach as we valued being able to deduce research questions unbiasedly (Lo Iacono et al., 2016) over the ability to source non-verbal cues in detail. As Lo Iacono et al. (2016) note, Skype data compares favorably to data from face-to-face interactions and, in some cases, represents an even better option.

Once we completed our interviews, we transcribed each one. Following Gioia et al. (2013), we used the transcripts to code our results. We used the software program MaxQDA for the coding. We followed Strauss and Corbin (1998) in initially conducting first-order coding to identify general concepts and categories while remaining faithful to each interviewee's words. Since both authors simultaneously coded the interviews, the number of codes quickly became unwieldy. We realized many informants referred to the same thing but used different terms. After we independently performed the initial open coding procedure, we constantly discussed the results until we settled on the final categories that we present in this paper. Afterward, we created second-order themes to better explain the commonalities between our first-order themes and data-driven project challenges.

4 Results

In line with our research questions, we focused on identifying three aggregated constructs: challenges, opportunities, and value creation. Challenges involve three perspectives that we categorized as first-order constructs. While technical and societal challenges obstruct metaverse platforms' feasibility, user-related and organizational challenges impede their usefulness for platform members. As for opportunities, we identified user-related and organizational opportunities as the two primary constructs. Lastly, regarding value creation, we refer to functional, social, and emotional values as Sweeney and Soutar (2001) conceptualized them. We discuss each construct in turn.

4.1 Overcoming Challenges to Realize Metaverse Platforms

By overcoming challenges to materialize metaverse platforms, we can realize their potential and create value with them. In Figure 3, we use notation from Gioia et al. (2013) to consolidate and summarize our results and overview the challenges.

We identified four groups of challenges: challenges that result from technology, challenges that arise from society, challenges that confront organizations, and challenges that confront individuals. Our interview participants pointed out that, without the right technology and societal acceptance, one could not realize metaverse platforms' potential and value. Accordingly, one must understand and evaluate existing challenges to realize their potential.

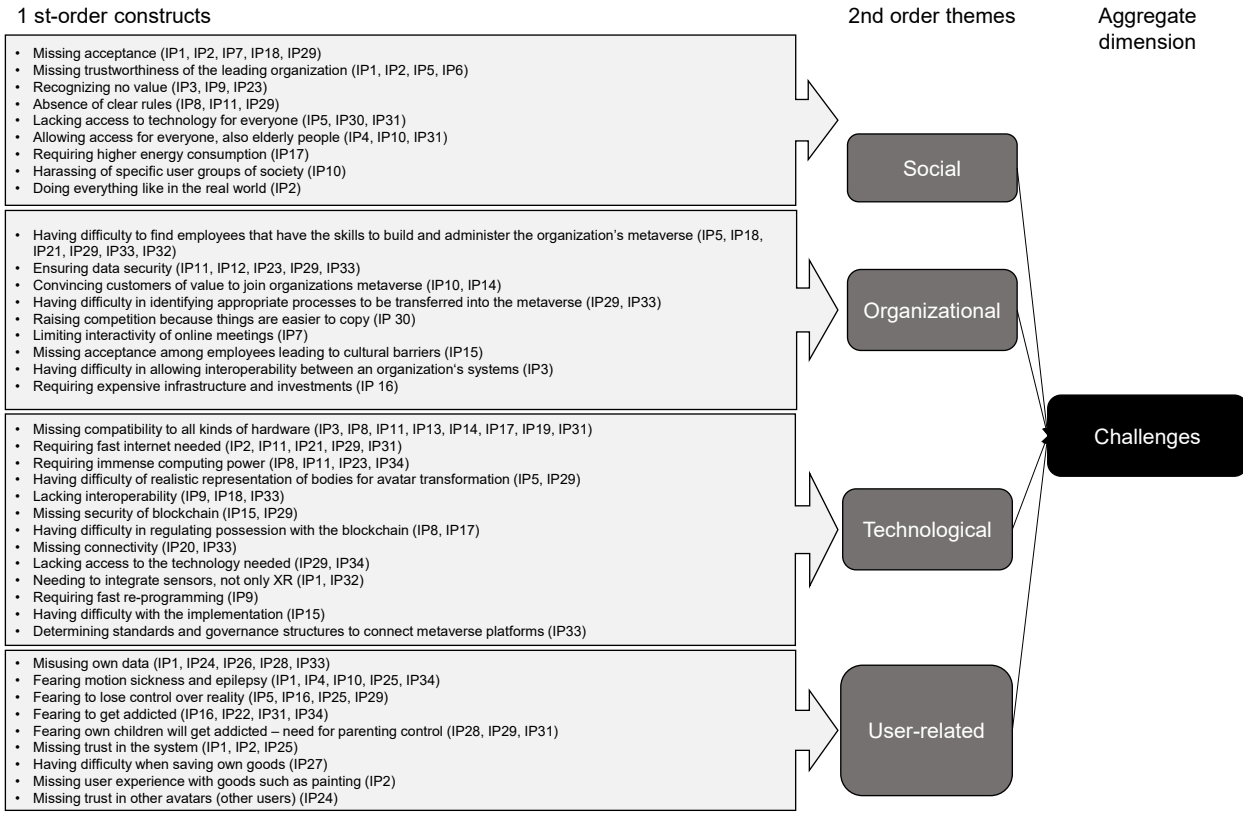

Figure 3. Challenges for Metaverse Platforms

From a technological perspective, most participants mentioned that the metaverse needs to be compatible with different hardware types (IP3, IP8, IP11, IP13, IP14, IP17, IP19, IP31). In other words, metaverse platforms must be accessible through mobile phones and computers and connected with devices such as XR technology and body sensors. Our participants also mentioned the high demand for computing power (IP8, IP11, IP23, IP34) and Internet speed requirements to host a metaverse platform ecosystem (IP2, IP11, IP21, IP29, IP31). As Figure 3 demonstrates, metaverse ecosystems challenge technological infrastructure by building on seamless transitions between different ecosystems and platforms. The computing power needed to realize these metaverse functionalities dramatically exceeds what existing solutions that combine more than one platform in their respective ecosystem require. Additionally, interviewees frequently referred to the need for technology to scan users' bodies. Such technology needs to be made available to every metaverse user, as IP29 described:

> *…In the metaverse, I need my avatar with my body index because each product that I try in the metaverse fits (or does not fit) the same as in the real world. We can't realize this so far, but if we could be able to realize it, users would directly jump into it and use it.*

Besides overcoming technological challenges, we must understand challenges originating in society. In this dimension, participants most often mentioned acceptance (IP1, IP2, IP7, IP18, IP29). Despite emerging research foci on metaverse platforms, we still lack knowledge about these platforms' complex operation and application contexts. The absence of details on how metaverse platforms function could likely cause societal members to reject them and, thus, impede individuals from using them. Our participants also emphasized that our society will likely encounter difficulties comprehending metaverse platforms' value potential in their current developmental stage (IP3, IP9, IP23). Some of our participants mentioned that we do not have a metaverse yet. They questioned if there is going to be one metaverse hosted by one big organization (e.g., Meta) or if there are going to be a multitude of metaverse platform ecosystems. Platform owners, customers, and complementors must deal with different tasks and responsibilities depending on the metaverse platforms that are available in the future. Accordingly, our interviewees emphasized the role that trust would play in single-owner, central metaverses (IP1, IP2, IP5, IP6). For instance, IP1 said:

> *Meta has lots of power, and the question here is how much power we are giving them (…). We need to be careful about how we handle this. And this is up to our society because I think that each organization that is part of the metaverse has its interest, and our society needs to figure out how we handle this.*

Our participants also mentioned nonexistent behavioral rules for users in the metaverse as another challenge (IP8, IP11, IP29), which could result in problems such as harassment (IP10) (Wong, 2021). To showcase this challenge's severity, some participants even proclaimed the need for metaverse police (IP25). From a societal perspective, the metaverse needs to be open and usable for everyone (e.g., it should also involve elderly people who might struggle with using new technology) (IP4, IP10, IP31). Making the metaverse accessible for everyone also includes whether users can acquire required technologies (e.g., XR devices or body sensors) at an acceptable price.

From an organizational perspective, our interviewees mostly referred to challenges regarding data security (IP11, IP12, IP23, IP29, IP33). Furthermore, they emphasized new skill requirements for employees to manage an organization's presence in a metaverse (IP5, IP18, IP21, IP29, IP32, IP33). For example, IP21 said:

> *The biggest challenge is that organizations do not have expertise with VR and AR (…). An organization also needs someone who fully understands what the metaverse is and how it can be controlled, and this person also needs to control it".*

Once organizations realize metaverse platforms, they face challenges convincing customers about the value connected to their metaverse platform ecosystem(s) (IP10, IP14). Some participants mentioned their struggle to determine the processes that the metaverse should represent. Foremost, they referred to the need to adapt goods, processes, and business models to enable any individual to enter a metaverse platform (IP29, IP33). Additionally, organizations must define their role in a centralized or decentralized metaverse platform, including their responsibilities as platform owners or even orchestrators.

Mirroring the user perspective, participants mentioned that users fear data misuse most (IP1, IP24, IP26, IP28, IP33) or losing their perception of reality (IP5, IP16, IP25, IP29). Users understand the metaverse to represent an idealized version of the physical world. For example, participants elaborated that one might find it easier to do some things in the metaverse than in real life because the former would not necessarily result in real consequences. In this regard, IP32 mentioned that some teachers let their students work in a metaverse lab to avoid potential damage to expensive lab material.

However, many participants feared losing control over how much time they spent in the virtual world. The fear of losing control is related to the health-related issue of addiction (IP16, IP22, IP31, IP34), addiction of their children (IP28, IP29, IP31), and motion sickness and epilepsy from spending too much time in the metaverse (IP1, IP4, IP10, IP25, IP34). For example, IP31 mentioned:

> *I think what is very important is to make it safe for children and young people. They are actually more easily affected by this experience, and they grow up with this kind of mixed physical and virtual world. What happens in the virtual world can be very important for them, maybe more important than what they actually experience in the physical world.*

4.2 Realizable Opportunities with Metaverse Platforms

On the condition that the above-described challenges can be overcome, most participants agreed that metaverse platforms created plentiful opportunities and had value potential for individuals, organizations, and society. Like with challenges, our participants stated opportunities from an organizational and user perspective.

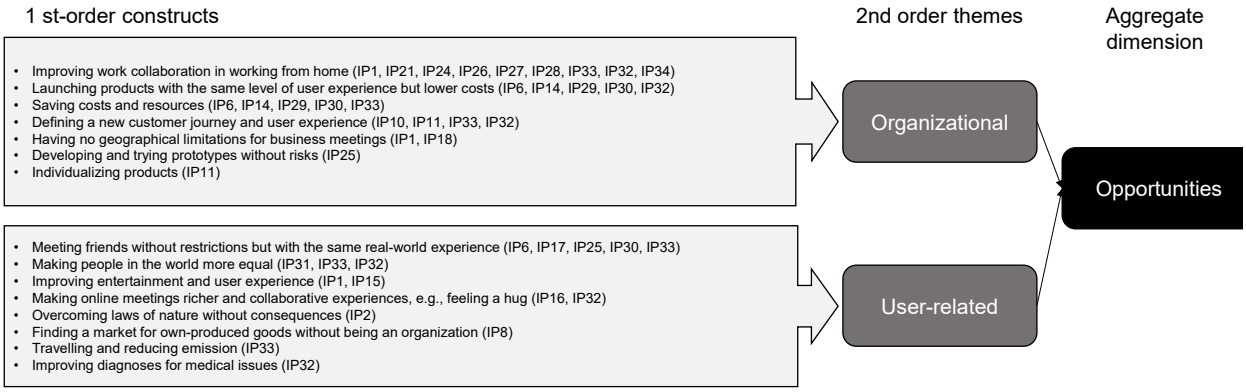

Figure 4. Opportunities for Metaverse Platforms

From an organizational perspective, the opportunity mentioned most often entailed developing and launching products and services at lower cost and more quickly but with the same (or even better) user experience than conventionally (e.g., not renting a venue for concerts, conferences, or business meetings) (IP6, IP14, IP29, IP30, IP32).

However, virtual service offerings often involve many different ecosystems and platforms similar to what we present in Figure 3. For a fashion show, for example, the ecosystem must entail a store to purchase tickets, a bank to withdraw money, and complementors that offer content. Apart from large gatherings, the metaverse empowers employees to shape their employment conditions (e.g., by working from home or offering new communication channels) (IP1, IP21, IP24, IP26, IP27, IP28, IP33, IP32, IP34). This scenario seems less complex. Participants referred to solutions such as Gather.Town, which virtually represents real-world office spaces. However, in this environment, users can only conduct work activities.

Addressing organizational processes, our participants mentioned the opportunity to test a prototype without the hazards present in the real world. For example, IP25 said:

> *If I have an idea for a technical solution in the real world, I would need to get all resources for it, like money, to realize it, and I can then build this prototype which costs me lots of time and money. In a virtual setting, I could save time and money because I could get some of these things without spending money.*

Most participants' statements on the user perspective concern an improved user experience (IP1, IP15), which involves the ability to meet with friends without restrictions (IP6, IP17, IP25, IP30, IP33) and to mirror real-world interactions (e.g., hugging a friend) (IP16, IP32). IP8 mentioned the metaverse's ability to offer a market to those individuals that want to create and deliver goods without interference from a central mediator. The opportunity to better support individuals' creativity reflects this study's theoretical background as consumers increasingly become complementors in producing and commercializing their goods.

4.3 Creating Value with the Metaverse

Summarizing the opportunities in realizing metaverse platform ecosystems, we asked our participants about the resulting value types.

We categorize value as presented in our theoretical background; namely, functional, social, and emotional value (Sweeney & Soutar, 2001). Our participants referred to emotional value least. We can explain this finding since the metaverse does not exist yet, which makes it challenging to describe hypothetical emotions. However, our participants mentioned experiencing real feelings and emotions themselves already (e.g., when attending a virtual concert) (IP9, IP12, IP31, IP32) and included aspects such as feeling a virtual hug (IP16).

Our participants mainly associated social value with meeting, communicating (IP2, IP3, IP9, IP14, IP15, IP16, IP20, IP32, IP34), and collaborating with others (IP14, IP28). In particular, they expected the former to differ in the metaverse compared to the physical world. In a metaverse, social interaction involves interaction between users' avatars as they create a social presence. Avatars' facial expressions, tone, voice, or text further facilitate social interaction. Considering users' immersion through 3D technologies, the

metaverse can elicit real feelings (such as feeling a hug). Simply stated: the metaverse can change how we virtually socialize and, thus, can contribute social value.

Our participants referred to functional value more than any other value type. Most participants considered the willingness to pay as a proxy for perceived value (IP4, IP7, IP13, IP17, IP31). Others mentioned that the metaverse could simplify processes by automating complex services that consume lots of time in the real world (IP15, IP19, IP27). Additionally, they highlighted opportunities for educational activities. They mentioned simplified teaching (IP9, IP32) due to a new experience-based learning approach. Some participants referred to overcoming geographical limits (IP3, IP9, IP22, IP31) to more easily learn foreign languages (IP14), such as by effortlessly interacting with native speakers worldwide. IP2 mentioned that functional value results from a better haptic experience.

IP16 and IP33 mentioned that metaverse platforms create value by supporting creativity. In particular, participants mentioned non-fungible tokens (NFTs) (e.g., IP29 mentioned NFT in terms of creating a better customer interaction) along with generating creative innovations and, thus, value. NFTs constitute digital assets (e.g., images, videos, songs, or virtual land), and users primarily trade them through a metaverse online market. They can facilitate digital innovations through their connection to the blockchain.

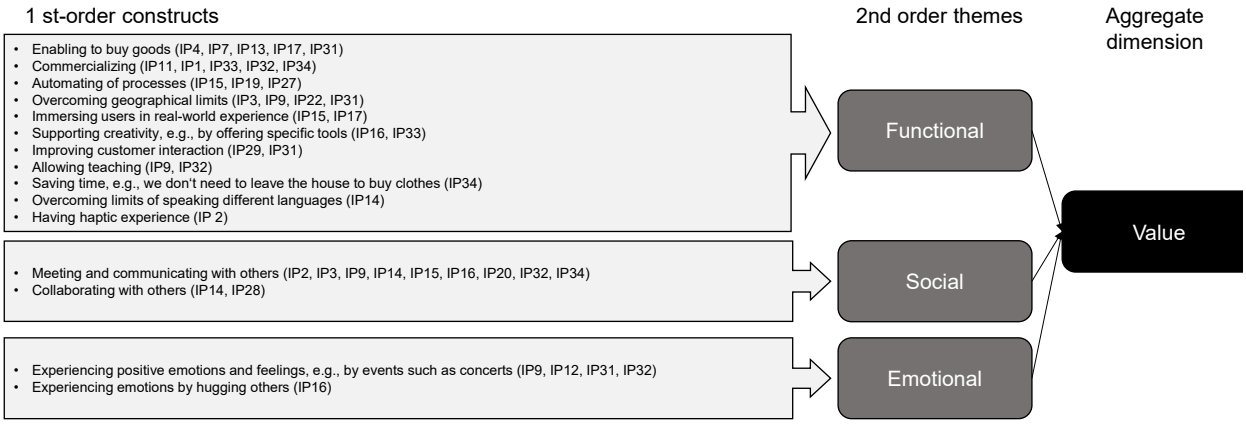

Figure 5. Value Creation with Metaverse Platforms

5 Discussion and Contributions

In this paper, we identify challenges, opportunities, and value potentials that metaverse platforms create (RQ1, RQ2, RQ3). Figure 6 summarizes our results and provides an overview of future research avenues that we present in the next section. To realize metaverse platforms, challenges need to be overcome. We can use the displayed opportunities to realize the value potential in metaverse platforms. Metaverse platforms will be experience-oriented and exceed what traditional and online platforms can offer (see Figure 2).

Metaverse platforms remain in their early developmental stages (Peukert et al., 2022). In particular, platform owners and, thus, organizations should consider existing digital twins that one can easily transfer back and forth between the real and virtual worlds (Liu et al., 2021). Our participants focused on the challenge of identifying processes that can be transferred into the metaverse. This challenge also involves the crucial technical challenge of guaranteeing persistent goods. Additionally, a metaverse platform must simultaneously connect several platforms and enable users to transfer between them freely and seamlessly (Owens et al., 2011; Suzuki et al., 2020). Meta (formerly Facebook), for example, promotes its metaverse as a unified 3D world that combines different organizations[1]. However, currently, many fragmented digital domains develop their own metaverse experiences. Some solutions cannot operate with one another since different platforms host them.

Additionally, a metaverse platform offers central control: every transaction, interaction, and activity between a user's avatar and an organization connects via a metaverse platform (Park & Kim, 2022). A metaverse platform facilitates the coordination and efforts of complementors, customers, and platform owners.

[1] https://about.meta.com/de/meta/

Accordingly, our participants feared that only one organization would control and handle data. However, as our participants mentioned, neither users nor organizations want to lose control over data. Therefore, new approaches must compromise between protecting privacy-related data and using it commercially (Bandara et al., 2020). Further, new questions arise about the vast data streams' transferability, manageability, and storage (Schuff et al., 2010). Thus, politicians and technical experts need to discuss the data ecosystems surrounding a metaverse platform. To date, global data cloud storage amounts to over 1024 petabytes in volume[2]. A metaverse platform requires significantly more data than what a typical platform nowadays needs, which largely results from integrating diverse technologies (e.g., VR and AR, blockchain, avatar interactions, and social media platforms) into it and the interaction between such technologies. With such an amount of data, energy consumption will result in discussions around sustainability as our participants mentioned.

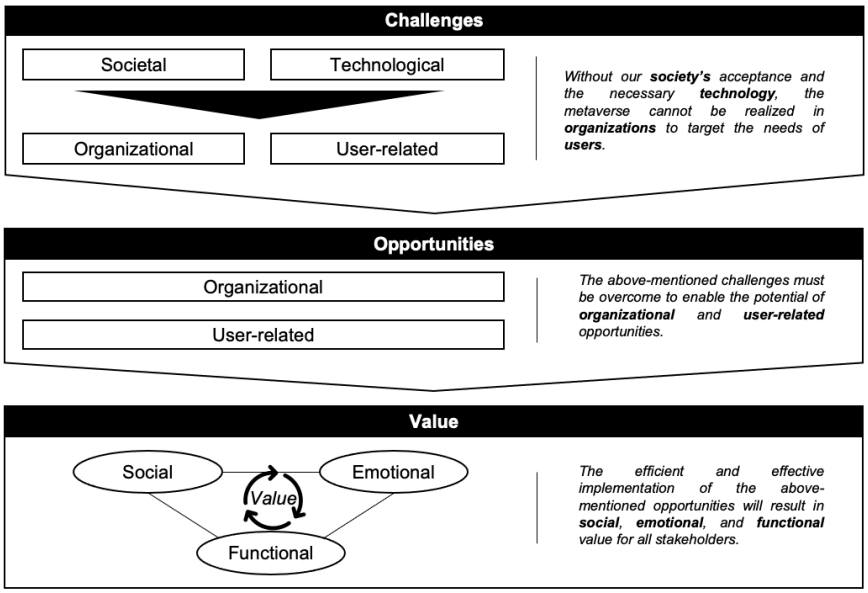

Figure 6. Summarized Results

Additionally, what user experience means will likely change and involve another perspective on value creation in digital environments. Ultimately, organizations create metaverse platform ecosystems to create value. This value, however, extends beyond simply improving the user experience. A metaverse platform ecosystem can also create organizational and societal value. A metaverse cannot exist if organizations and users fail to understand the value they can gain from using it. Our participants mainly perceived the metaverse's functional values. To use its opportunities and value potential, we must better understand constructs such as trust, user acceptance, and motivational issues (i.e., the degree to which users find it engaging, motivating, and satisfying to interact in a metaverse). More profoundly understanding such constructs also involves discussing how to support social and emotional values in detail. Furthermore, the perspectives on the metaverse and it can create value for each involved stakeholder (e.g., users, organizations, and society) matter. For instance, some newspaper articles and research studies (Müller, 2012; Wright et al., 2008) have pointed toward another direction: a metaverse that mimics the real world and allows one to experience everything like reality only with a virtual device.

Our participants suggested that organizations that want to create metaverse platform ecosystems should provide a virtual environment that supports the user experience. For instance, they need to consider how their business models may change. If organizations exist in the metaverse and even offer some goods solely on metaverse platforms, new business models will result. Furthermore, organizations also need to think about how they present their goods and how the goods connect to the real world. For example, McDonald's could deliver food offered in the metaverse to places in the real world.

[2] See https://www.globaldots.com/resources/blog/how-much-is-stored-in-the-cloud/

5.1 Contributions

Our work contributes to theory and practice in several ways. From a theoretical perspective, we examine what metaverse ecosystems mean (in general and from experts' perspectives), their role for users and organizations, and the challenges in realizing their potential. We also discuss how metaverse platforms can create value. We support practitioners in better understanding what they should consider once they enter the metaverse. In other words, we present challenges that organizations must overcome to create metaverse platforms or participate in an ecosystem that involves metaverse platforms. Furthermore, we discuss what opportunities metaverse platforms may create and demonstrate how organizations can create value by assisting them in identifying relevant processes to transfer to the metaverse.

6 Limitations and Future Research

As with any study, this one has limitations that provide opportunities for future work. First, we conducted a qualitative study because the metaverse remains nascent. Critically speaking, we cannot say that a metaverse exists yet. Thus, we interviewed experts to gain their perspectives on potential challenges, opportunities, and value creation. With a qualitative approach, we did not provide details for each aspect. Thus, we leave it to future research to explore each challenge in more detail (e.g., by evaluating the most critical challenges). Additionally, our participants did not identify many aspects to create social and emotional value. When (or if) metaverse platforms actually exist, future research needs to analyze how they can create value in more detail. Lastly, while we asked researchers and practitioners to participate in our study, future research should also involve users to understand their perspectives on the metaverse. By considering different perspectives, research and practice can determine what supports or limits the openness towards the metaverse. As this study involved experts with somewhat positive attitudes towards the metaverse, future research could benefit from studies considering the perspective of individuals who feel reluctant about joining the metaverse.

In Figure 7, we summarize our suggestions for future research. They build on the argument that realizing value on metaverse platforms will inevitably foster individuals and organizations to accept them (see Figure 6). Ultimately, organizations that want to convince users to enter the metaverse are interested in creating value. In other words, we have begun observing a shift towards more experience-oriented online platforms. Thus, in our figure, we provide suggestions for future research from different perspectives: platform owners, managers, and users. Our results indicate that a successful metaverse will likely require these three groups to participate. Metaverse platforms will be experience-oriented but still involve aspects of traditional and online platforms (Papagiannidis et al., 2008).

Platform owners, or anyone who hosts and manages a metaverse ecosystem, represent important stakeholders in such an ecosystem. This assertion holds whether it concerns a centralized or decentralized platform. Further, we need to answer how one can transfer virtual goods from the metaverse to the real world. Metaverse designers must consider how to incorporate persistent goods and the connection between platforms. Such questions raise several follow-up questions about interoperability, Internet speed, and computing power (among others that IP2, IP3, and IP8 mentioned). They also raise questions about how and what data to store. Our participants mentioned some aspects involving privacy-related issues, such as data security (IP11, IP12, IP23, IP29), which the actors who manage metaverse platforms need to handle effectively. From a user perspective, future research should explore how the metaverse alters user interaction. More crucially, scholars should focus on developing concepts to mitigate health endangerment and support sustainable user acceptance (involving aspects such as motion sickness as IP1, IP4, IP10, IP25, and IP34 mentioned). We further emphasize privacy-related issues around metaverses—an area where we lack the proficiency and understanding to develop satisfactory solutions. Lastly, from a managerial perspective, one faces challenges identifying the appropriate processes to transfer to the metaverse (IP29). Besides, new business models and new value chains will emerge. Furthermore, the interaction between stakeholders, organizations, and customers will change lastingly (IP10, IP14). Future research will need to elaborate on the role these aspects will play in efforts to build experience-oriented metaverse platforms that individuals and organizations accept and that create value for all relevant stakeholders.

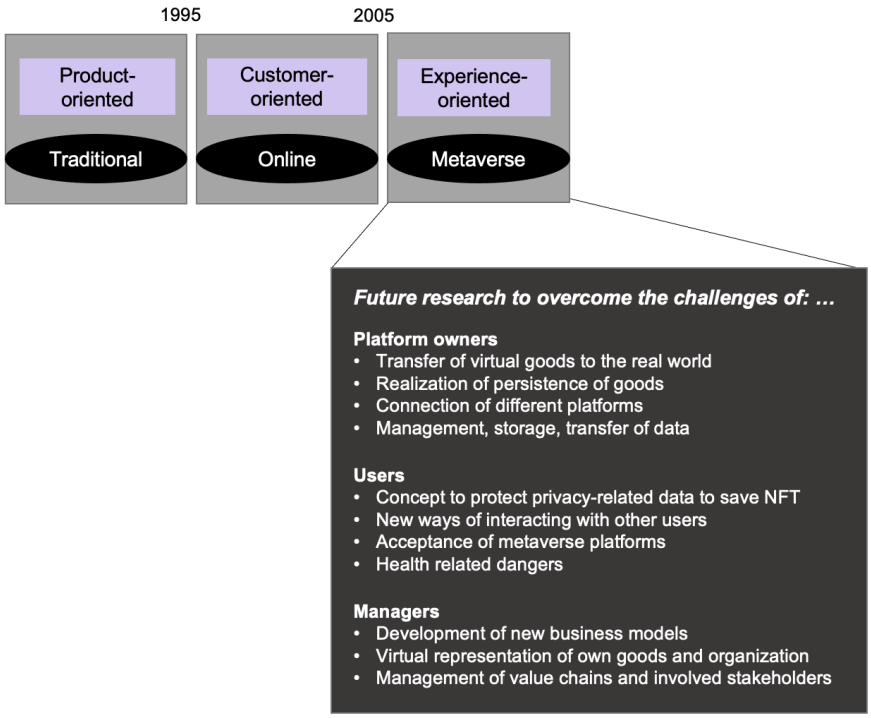

Figure 7. Implications for Future Research Towards Experience-oriented Metaverse Platforms

7 Conclusion

In this paper, we identify challenges that face metaverse platform ecosystems (RQ1). Second, we examine the potential for the metaverse (RQ2) to create value (RQ3). To do so, we used a qualitative approach and interviewed 34 metaverse experts. Our results demonstrate that technical and societal challenges obstruct efforts to efficiently handle user-related and organizational challenges. Once we overcome such challenges, we can use the opportunities that our participants identified and create functional, social, and emotional value. With our work, we theoretically contribute by profoundly explaining metaverse platform ecosystems and what obstructs their realization. With our qualitative approach, we provide room for future research studies to concentrate on better understanding the role and meaning of value creation in the metaverse. We support practitioners by clarifying metaverse platforms' potential and usefulness.

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Appendix A: Demographics of Interview Partners

Table A1. Demographics of Interview Partners

Numbering (IP)	Gender	Position
1	Male	Project leader crane technology
2	Male	CEO marketing agency
3	Male	Project leader mobile in marketing agency
4	Male	Employee marketing department
5	Male	Project management public city service
6	Male	Project leader port authority
7	Female	Modern workplace consultant—IT consulting
8	Male	CEO automotive sector
9	Male	Service consulting
10	Male	Business developer
11	Male	Distribution
12	Male	CEO event management
13	Male	Freelancer and lecturer for digital transformation
14	Male	CEO software development business
15	Male	Researcher
16	Female	Researcher
17	Male	Researcher
18	Male	Researcher
19	Female	Researcher
20	Male	Researcher
21	Male	Researcher
22	Male	Researcher
23	Male	Researcher
24	Female	Researcher
25	Female	Researcher
26	Male	Technical consultant
27	Male	Game designer, escape room owner
28	Male	Freelancer in marketing
29	Male	Founder and CEO of NLP venture
30	Male	CEO IT consulting
31	Female	Innovation strategist
32	Female	Researcher
33	Female	Researcher
34	Female	Researcher
Mean age total (n = 34): 36. Mean age females (n = 9): 31; mean age males (n = 25): 38. Mean age researchers (n = 14): 31; mean age practitioners (n = 20): 39.		

Appendix B: Interview Questions

Table A2. Interview Questions

General questions
How old are you and what is your working position?
What is the metaverse for you?
How would you characterize the metaverse?
How did you get in touch with the metaverse?
Do you think that a metaverse already exist? If so, which one and which examples do you have in mind?
Challenges, opportunities, and value
Can you elaborate if you think the metaverse is a risk or an opportunity?
What are challenges that need to be overcome to successfully enter the metaverse?
Which challenges out of the society do you think exist regarding the metaverse?
Which technical challenges do you think exist regarding the metaverse?
Which organizational challenges do you think exist regarding the metaverse?
Which user related challenges do you think exist regarding the metaverse?
Which opportunities do you think exist by realizing the metaverse?
How does a metaverse support value creation?
Concluding questions
How do you think will the metaverse develop?
Which future research questions do we need to focus on regarding the metaverse?
Which last thoughts do you have in mind regarding the metaverse?

About the Authors

Sofia Schöbel is an assistant professor in information systems at the University of Osnabrück. She has written her PhD about gamification in digital learning from the University of Kassel. Her research focuses on persuasive system design, designing smart personal assistants, digital transformation of services, and the design of interactive processes in digital learning. Her research has been published in different outlets such as the *European Journal of Information Systems*, Communications of the *Association of Information Systems* and in leading information systems conferences such as the *International Conference of Information Systems* and the *European Conference of Information Systems*.

Fabian Tingelhoff is a PhD candidate and research associate at the University of St.Gallen. In his dissertation, he investigates platform ecosystems in the context of the Metaverse. His research focuses on organizational endeavors in the metaverse, value creation potentials in the metaverse, and data exchange mechanisms in platform ecosystems. Throughout his PhD, he received the merit-based doctoral scholarship of the renowned German-based *Konrad-Adenauer Foundation (KAS)*.

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