Not everything is a Metaverse?! A Practitioners Perspective on Characterizing Metaverse Platforms

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Abstract

Organizations claim to host what is called a metaverse– an extended version of our real world. First rudimental realizations of such metaverses can be found throughout the internet, e.g., Epic Game's Fortnite. At the same time, research and practice struggle to specify what a metaverse truly is and how we can characterize it. With our work, we analyze the proximity of the realization of a holistic metaverse platform and present the results of a qualitative interview study (n=30). The goal of our work is to use the expertise of practitioners to discuss different examples that claim to represent a metaverse, e.g., Second Life and Decentraland. To achieve this goal, we develop a typology we call the Metagon and use it to evaluate existing metaverse platforms. We contribute to theory by clarifying the meaning of metaverse platforms. Practitioners are guided by a demonstration of metaverse characteristics.

Keywords: Metaverse, Platforms, Metagon, Interviews, Typology

1. Introduction

A recent hype supported by Facebook's CEO Marc Zuckerberg led to numerous investments involving something that is called the "metaverse" (Duan et al., 2021). Originally, the metaverse was introduced by Neal Stephenson. His novel Snow Crash from 1992 has been discussed among practitioners and academics, especially with the emergence of the game Second Life in 2003 (Inman et al., 2010). A typical nomination for the metaverse is the combination of the word "meta" (meaning beyond) and the stem "verse" from the universe (Dionisio et al., 2013). In other words, it is oftentimes pronounced as a virtual world that is intertwined with and based on (at least part of) the metaphors of the real world.

Many platform owners such as Meta or Epic Games already classify their existing or developed platforms as a metaverse. However, looking at both research and practice reveals that controversies arise based on different understandings of what a metaverse platform truly is (Duan et al., 2021; Park & Kim, 2022).

Definitions of the metaverse are oftentimes vague and not precise e.g. "a world like electronic memory and the internet as a virtual reality where users log in every day" (Müller, 2012). This leads to questions about what makes metaverse platforms unique from other kinds of platforms such as games, e-commerce, or social media platforms. Although the term metaverse has become a hype topic during the last month, research has already discussed the metaverse earlier after the launch of Second Life (Jaynes et al., 2003). For many researchers, Second Life is similar to what we understand as a metaverse platform – a real-world experience that is transferred in an online environment (Vernaza et al., 2012). However, with new technological developments, we have new solutions and possibilities for better realizing processes and aspects of the real world in a virtual world (Bourlakis et al., 2009). Especially due to new technological developments, practice and research struggle to understand the unique aspects of a metaverse platform compared to other platforms such as Second Life (Mystakidis, 2022). Therefore, the goal of our work is to unclutter the metaverse landscape by critically discussing the constituting characteristics of a metaverse and how close we are to realizing the first metaverse instantiations. In our analysis, we build on the visions given to us by research, practice, and the media to answer the following two research questions:

RQ1: How can we advance the academic understanding of metaverse platforms incorporating the practitioner's view?

RQ2: Looking at prominent examples, how close are we to realizing holistic metaverse platforms?

To answer our research questions, we analyze five existing metaverse platforms: Decentraland, Second Life, Fortnite, Pokémon Go, and Spatial. To evaluate how close these platforms are to sharing the characteristics of a holistic metaverse platform, we interviewed 30 individuals who are acting practitioners, who can be seen as experts in this young field, and develop a typology we call the Metagon. We decided on a qualitative and practitioner-oriented approach because collecting qualitative data is particularly useful as it allows for a detailed examination of a given topic when measurements are unclear. We used the interviews to derive the characteristics of metaverse platforms and to understand the maturity of praxis examples. With our work, we contribute to theory by characterizing metaverse platforms and by presenting and evaluating different examples. Accordingly, we provide guidance to researchers in realizing future research studies and guide practitioners in deciding about how to design a metaverse platform.

The remainder of the paper is structured as follows: In the next step, we present related work on the metaverse involving definitions and past literature. Afterward, we present our methodology and continue with the results. We first present the typology which we subsequently use to discuss five different metaverse platforms. We close this paper with a discussion, contributions, limitations, next steps, and future research.

2. Theoretical Background and a Platform Perspective on the Metaverse

The idea of metaverse is not entirely new. Visionaries such as Neill Stephenson developed the concept in 1992 and the creators of Second Life offered a first realization about 10 years later. In this context, metaverses have been studied from the early 2000s onward. Table 1 summarizes some definitions of the metaverse given by research.[1] A more detailed overview of existing definitions of the metaverse is given by Park et al. (2022).

Definition	Reference
A world where humans as avatars interact with each other and with software agents in a three-dimensional space that reflects the virtual world.	Stephenson (1992)
A technical challenge of making something close to the complexity and realism depicted in Snow Crash.	Ondrejka (2005)
A world of enhancing the feeling of being in a classroom rather than being an incorporeal observer in a 2D virtual environment.	Bruns et al. (2007)
An immersive three-dimensional virtual world in which people interact with each other and their environment, using real-world metaphors but without physical limitations.	Owens et al. (2011)
A world like electronic memory and the internet as a virtual reality where users log in every day	Müller (2012)

Table 1: Defining the Metaverse - A Researchers Perspective

The five definitions demonstrate overlaps and inconsistencies. Stephenson (1992) presents a rather broad definition that would make differentiating it from certain kinds of gaming platform difficult: In general, we can refer to a serious game as something beyond a real game that adds a serious purpose to a game involving storytelling and narration as a part of a thoughtful process (Wouters et al., 2013). What we understand as a serious game is closely related to what is understood as a metaverse by Stephenson – however, we have to admit that Stephensons' definition originates prior to the evolution of realistic gaming platforms. Ondrejka (2005) has a more practical view of the metaverse and connects it to a vision of a book disregarding related work of academia and practice. The definition of the metaverse given by Bruns et al. (2007) positions metaverses closely to what we understand as VR solutions, diluting their differentiation. In our work, and supported by practitioners, we agree that metaverses involve immersive technologies but extend it beyond VR to include augmented solutions (AR). The definition by Owens et al. (2011) is more concrete and discusses how to transcend the real world metaphors into a virtual setting to disregard physical limitations. Lastly, the definition by Müller (2012) debates the role of the internet, again questioning what distinguishes a metaverse from a regular internet platform. Newer definitions are given by Duan et al. (2021) who define the metaverse as a world in which users can interact as avatars in combination with software applications in a 3D virtual space. This is close to Suzuki et al. (2020) who describe the metaverse as a world of dimensions in which an avatar acts on behalf of users in a virtual world.

Ultimately, all presented definitions fail to incorporate certain characteristics of a metaverse platform. Some of the definitions even reference existing technology letting us question the uniqueness of metaverse platforms, e.g., compared to gaming platforms. However, recent technological developments offer new perspectives on metaverses. For example, new technologies such as blockchains enable us to execute transactions without the necessity of intermediaries (Sunyaev, 2020), artificial intelligence (AI) assists us in realizing new ecosystems (Lisetti & Schiano, 2000), as well as virtual reality (VR) and artificial reality (AR) technology that supports us in interacting in new ways with others, with technology (Barry et al., 2015) and with digital twins (Liu et al., 2021).

In research, metaverse platforms are inspired by the design of gaming platforms, social media environments, and e-commerce platforms. Additionally, the metaverse is handled as the next generation of the world wide web, better known as Web 3.0. Technological developments are encouraging companies to invest in metaverse platforms or to cooperate with gaming platforms, e.g., Fortnite and Coca-Cola. Research generally aims to formulize and abstract the essence of information derived

[1] The wording was revised to avoid direct citations

from real-world settings. However, as many organizations present their solutions as metaverses, a theoretical and practical "state of chaos" emerges where practitioners and researchers lose sight about the actual meaning of the concept they try to describe. Therefore, in our study, we discuss the different characteristics of a metaverse platform and use examples to demonstrate how close we are in realizing metaverse platforms.

3. Methodological Approach

For our work, we decided to use a qualitative approach because we want to explore the motivation behind human and organizational behavior (Draper 2004). As such, we employ an interpretive and social constructivist perspective (Merriam & Grenier, 2019). To support the validity and reliability of qualitative data, Lincoln and Guba (1985) suggest the following factors to be considered: credibility, transferability, dependability, and confirmability. Credibility (sometimes referred to as internal validity) refers to the congruence of one´s finding in relation to reality (Merriam & Grenier, 2019). As interpretivists, we assume that our informants "are treated as knowledgeable experts" (Gioia et al., 2013, p. 26). To ensure the credibility of our informants, we considered if they were experienced in topics determining the existence of the metaverse, e.g., VR, AR, gaming, and involved those that are currently working on developing a metaverse for their purposes. To further increase credibility, we applied member checks, which include independent coding of all interviews by the first two authors for both the Metagon categories and the coding of our examples. To ensure intercoder reliability, initial coding results were critically discussed until the 1st order codes were sufficiently reviewed and a second iteration could start. This process was repeated after all coders could ensure that 1st order codes were on comparable levels of abstraction and reflected the experience of each informant.

Transferability signifies the degree to which results collected from one study can be translated to a different setting with different participants. While purists of interpretivism would argue for the idiosyncrasy of qualitative research depending on context and each individual's properties, we agree with researchers such as Gioia et al. (2013) that qualitative, inductive research can produce structurally transferable insights. To improve recognizing transferability to the best of our abilities, we provide additional context information on each informant. Dependability or reliability describes the extent to which research findings can be replicated (Merriam & Grenier, 2019). We noticed a high degree of concept/coding saturation after the twentieth interview and patterns of recurring challenges started to emerge. Confirmability mainly deals with the issue of objectivity, i.e., researcher bias and its effect on the outcomes of a study. Ideally, a researcher should be objective and factual, but since this is, especially under the constructivist view, nearly impossible, all researchers were at least aware of potential biases, which were critically and proactively addressed during the analysis phase.

In total, we involved 30 persons (IP1 to IP30).[2] We recruited them via social networks (mostly LinkedIn). The interviews were conducted online and lasted between 24 minutes and 51 minutes. Our participants were on average 34 years old (min:26, max:51). We interviewed 5 females and 22 males. Each of our participants had a different work position reaching from, e.g., CEOs (IP12, IP2) to game designers (IP28), to VR developers (IP3), to international individuals out of academia researching metaverse (IP15-IP23). We use a questionnaire involving varying questions aiming to explore the characteristics of metaverse platforms. First, we asked participants about their background and demographics. Second, we asked them to specify how they define the metaverse, discuss its characteristics, and asked them to think about what makes it different from other platforms, such as gaming or e-commerce platforms. In the end, we asked them about challenges and examples, and to discuss with us how close developed solutions are in being categorized as metaverse platform.

4. Results

In the following, we first present the typology we call Metagon to characterize metaverse platforms. To do so, we used the interview results and added insights from literature to complement the different categories. Afterward, we use five examples to discuss how close they are to representing the characteristics of a holistic metaverse platform. As described in our methodological section, each example was coded by the first two authors leading to a complete match for each example. The characteristics were formulated so that only 0 (not possible) and 1 (possible) decision could be made for each characteristic.

4.2 The Metagon: a Typology to Characterize Metaverse Platforms

Figure 1 presents our typology. In our typology, we build on Duan et al. (2021)'s description that the metaverse is a combination of the physical world, the virtual world, and the intersection. The first category of

[2] We can provide a list of detailed demographics upon request.

our Metagon refers to technology which is a crucial aspect in the realization of a metaverse platform. Second, for representing a user's ability in the virtual world, we incorporate the category social. Third, the intersection is what we call the economy. In other words, the economy category reflects the company's and creator's roles and interests in linking a metaverse platform to the real world. For each of these three categories, we identified three sections that are reflecting different aspects. After analyzing our interviews, we screened the literature to add other important aspects that were not mentioned by our interviewees. An overview of the different sections and involved characteristics is given in Figure 2.

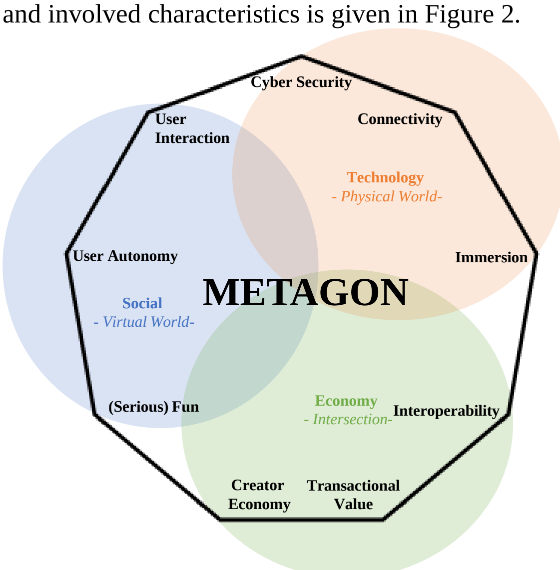

Figure 1: Metagon - A Typology of Metaverse Characteristics

At this point, we want to note that categories are overlapping, visualized by the crossing cycles. All combined determine a metaverse platform. Some of them are even connected.

For our category of technology, we found three aspects: cyber security, connectivity, and immersion. Claimed to be very important for metaverse platforms, cyber security is involving the security of user data and how transferred and produced data are analyzed, stored, and handled on a metaverse platform. Because a metaverse platform allows us to interact independently and because it represents our behavior differently compared to the physical world, it would allow organizations to analyze our behavior on another level, also manipulating us. Thus, all of our interviewees emphasized the importance of this aspect. A second aspect was named connectivity and represents the connection of the real world with a virtual world allowing for properties such as persistency. Lastly, immersion is intensively discussed as one crucial characteristic of metaverse platforms.

For the category of social, we identified user interaction, user autonomy, and what we named (serious) fun. User interaction considers every activity a user can do on a metaverse platform which differs from what users can currently do on other platforms. User autonomy defines how free users are in acting on a metaverse platform. Most of our interviewees mentioned the absence of rules in a metaverse allowing a fully autonomous behavior. Serious fun involves the nature of games on a metaverse platform and displays how metaverse platforms support engagement and fun by using game-like elements. Lastly from an economic perspective, we grouped creator economy, transactional value, and interoperability. The metaverse supports a creator economy, enabling users to freely develop their own products and merchandize in a virtual setting as well as in the real world. This category involves everything necessary to support a creator economy. Transactional value involves every transactional activity, e.g., the existence of one currency over all involved platforms.

We now shortly describe each of the categories to better support the later description of the different examples. We provide an overview about all characteristics for each category in Figure 2. Mentioned by all of our interviewees, the need for a better concept to protect privacy-related data involving the existence of a data security concept (IP13) was highlighted as ***cyber security***. We added some aspects to this, e.g., that users can decide about which and where their data are stored (Park & Kim, 2022; Zimmermann & Renaud, 2021) as well as that physical contact between avatars is only allowed upon the acceptance of other users. The latter is intensively discussed in relation to the metaverse as the proximity to the avatars of other users already created situations in which users felt uncomfortable.

Another important category named by our interviewees is the ***connectivity***, e.g., involving the persistency of items (IP6, IP9, IP13, IP17, IP27) or the aspect of entering other integrated platforms without restrictions (single sign-on). This means that no additional login is necessary, and users can easily switch between platforms having the same visual representation (IP9).

The category of ***immersion*** considers technology such as VR, or AR (IP16, IP17, IP20, IP21, IP24, IP25, IP26). All of our participants emphasized that a metaverse platform also needs to run without any device to allow everyone to enter it, also caring about aspects such as motion rendering (Park & Kim, 2022). Such calls reiterate similar demands voiced in past research: Duan et al. (2021), for example, determined accessibility and inclusion as key aspects of metaverses. Immersion and the design of metaverse platforms also consider the virtual construction of the real world (P10, IP11, IP16, IP22, IP15, IP24).

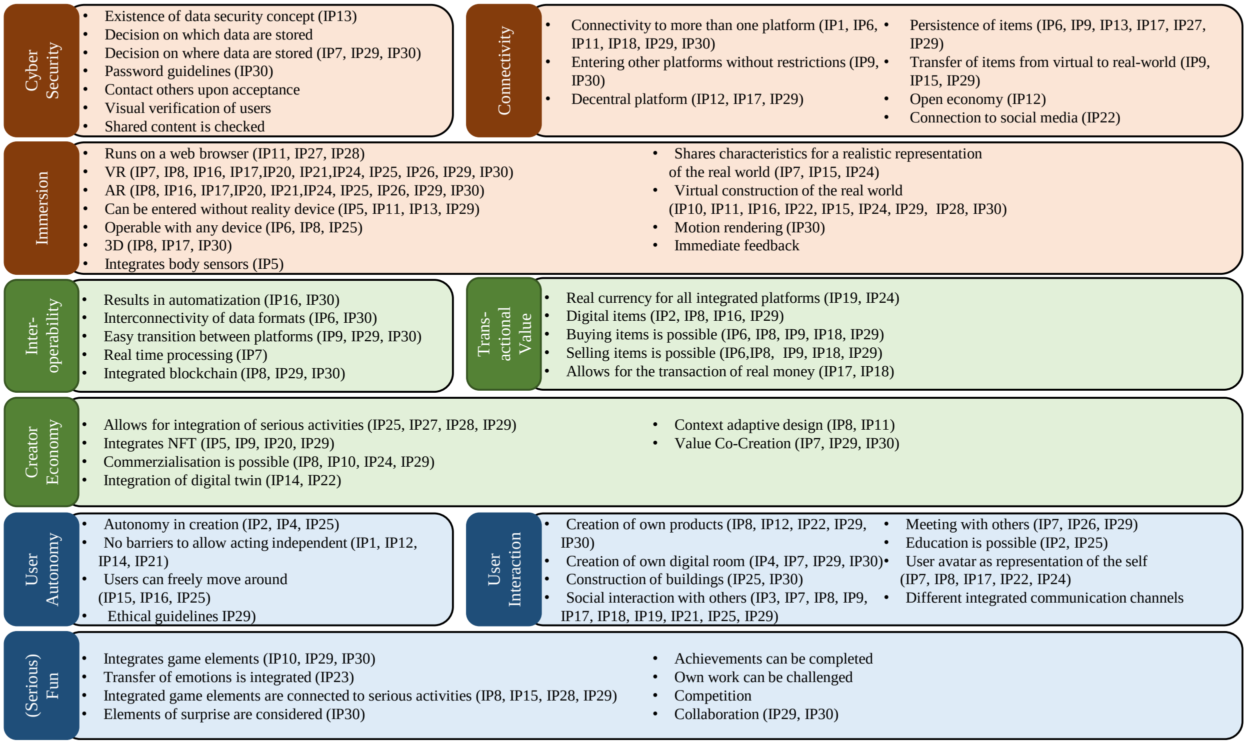

Figure 2: Overview of Categories and Characteristics

From the economic perspective, we considered ***interoperability*** including, among others, the interconnectivity of data formats (IP6), and an easy transition between platforms (IP9). Further, we added real-time processing (Choi & Kim, 2017) and the involvement of blockchain technology (Dowling, 2022).

For the ***transactional value,*** we considered aspects such as one real currency for all involved platforms (IP19, IP24), and selling and buying items allowing users to make real money in a virtual world (IP6, IP18, IP17, IP19). A category referenced repeatedly by our interviewees was what we named ***creator economy***. This category includes non-fungible tokens (NFT) (IP5, IP9, IP20) and everything involving commercialization (IP10, IP24). Commercialization is also possible on traditional e-commerce platforms. In a metaverse, users have no graphic default settings (IP4) but private rooms in which they can create and experience their developed goods (IP3). The real value of goods and items created in the metaverse realizes through their connection and presence in the real world, considering digital twins (IP14, IP22).

The third group of ***social*** involves everything that users can do in a metaverse resulting in a category of user interaction. Users have different ways of becoming actively involved in a metaverse, such as creating own products (IP12, IP22), creating own rooms (IP4), or even building houses (IP25). In such an environment, users are represented as avatars (IP17, IP22) that, ideally, mirror their physical appearance very closely. For *user autonomy*, we considered aspects such as autonomy in creation (IP2, IP4, IP25) or the absence of barriers so that users can interact independently of time and place (IP1, IP12, IP14, IP21). We added ethical guidelines to this aspect to account for inappropriate behaviors of users. Lastly, we included the category of *(serious) fun*, to consider aspects such as the existence of integrated game elements (IP10) but also the transfer of emotions (IP23). Further, we added aspects such as cooperation and competition (Hunicke et al., 2004) that are important aspects of making an online gaming experience more engaging.

In the following, we use our Metagon to assess different examples that claim to constitute a metaverse. We picked five different platforms, namely Second Life, Pokémon Go, Decentraland, Fortnite, and Spatial. Our selection is based on the following reasoning: While Second Life was claimed to be a metaverse in early 2010 already, the other examples got famous in research and media with the solutions they presented as the metaverse. We decided not to use Meta's Horizon because it is still not fully realized, making it in parts impossible to evaluate the different characteristics.

4.2.1 Second Life

A platform that is often referred to as metaverse is Second Life, which was part of many studies and discussions around 2010 (Inman et al., 2010). Simply saying, Second Life is an online platform allowing users to create an avatar for themselves and experience the created world of Linden Labs by meeting others, socializing, shopping, and creating things. We compared the characteristics with those of our Metagon to visualize how close Second Life is to constituting a metaverse platform. The result is shown in Figure 3.

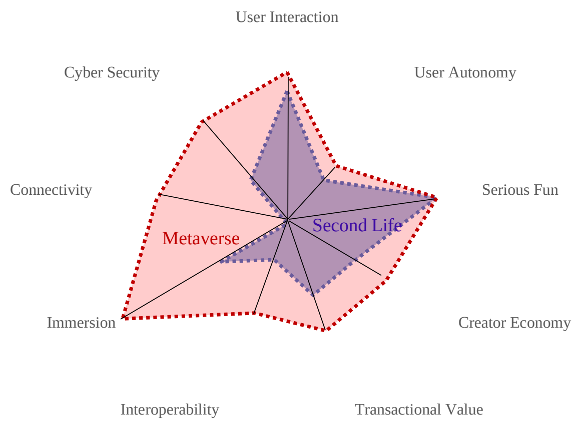

Figure 3: Second Life

The results of our coding highlight that connectivity is not supported in Second Life. It is one single platform that is not connected with other platforms complicating aspects such as persistency of goods and the connection to other platforms. On the contrary, Second Life supports all criteria for (serious) fun and almost all criteria for user interaction. Despite, Second Life lacks a representation of the self, e.g., allowing users to scan themselves to be represented in a metaverse. Immersion only scores 4 out of 10 characteristics because, so far, aspects such as VR and AR are not supported. Similarly, interoperability lacks interconnectivity of data formats, easy transition between platforms, and an integrated blockchain. Cyber security is also limited in parts, e.g., because there is no visual verification of users and shared content is not checked.

4.2.2 Fortnite

Another example that is often referred to as a metaverse is Fortnite. Fortnite was chosen by many different companies such as Lego to realize the company's vision of a metaverse platform. This could be due to the unreal engine as technological layer surrounding Fortnite, and that accordingly builds the basis for real time data processing, immersion, and UX design. Fortnite was developed by Epic Games and is an online game that allows different player modes, such as a cooperative mode or a creator sandbox mode. Figure 4 displays our comparison of Fortnite and the Metaverse.

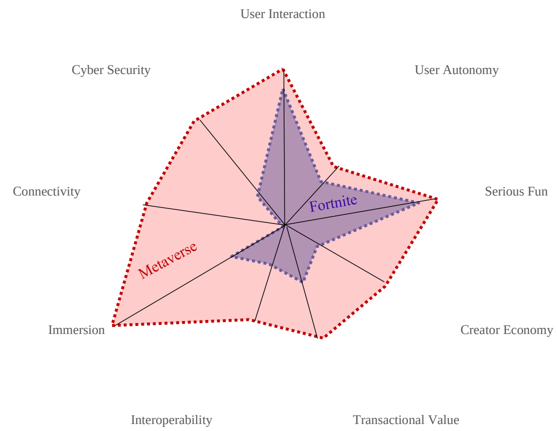

Figure 4: Fortnite

We can see that Fortnite immensely shares the aspects of a gaming platform reflected by serious fun and supports user interaction. It lacks in allowing for immersion and in supporting the creator economy. Whereas Second Life supports serious activities (e.g., teaching art students IP16) and allows for commercialization, context adaptive design, and value co-creation, Fortnite allows serious activities and commercialization, but all other aspects are not represented. Items in Fortnite can be bought but can't be sold. Fortnite was often part of discussions involving the metaverse because of their online events, such as concerts with famous singers. These aspects vaguely expanded its usage from a pure game to a virtual world that supports a gaming and user interaction-centered virtual experience.

4.2.3 Pokémon Go

We added another well-known game to our examples because it reflects what other examples do not yet consider: an AR environment. Especially AR environments are currently discussed by practitioners as being highly relevant for metaverse platforms compared to only VR supported solutions (Duan et al., 2021). In Pokémon Go, users can create their avatar and follow the objective of catching species called Pokémon by moving around in the real world. Figure 5 provides an overview of the characteristics that Pokémon Go and the metaverse share.

Pokémon Go is different from other metaverse platforms because it nearly allows for full immersion. Besides the inability to transport user emotions, all characteristics of serious fun are supported. Pokémon Go is rather weak along all other categories. Despite, it represents an AR solution that also considers motion sensors because users must move around in the real world to catch a Pokémon. None of the other examples supports this functionality.

However, we share the sentiment in research and practice that AR and the connection to the real world is one characteristic making a metaverse platform special and explicit. Another important aspect of Pokémon Go likewise referring to the connection to the real world, is the role of the Poké stops or arenas. Here, users can let their Pokémon fight against the Pokémon of other users, thus supporting competition. There is some evidence that real-world shops increase revenues when a Poké stop or arena had a close proximity to their stores. However, all other aspects are not present. Nevertheless, the connection to the real world and the AR solution presented in Pokémon Go represent important aspects for metaverse platforms.

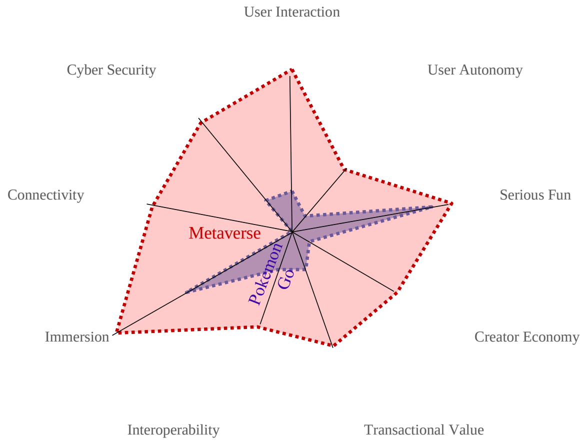

Figure 5: Pokémon Go

4.2.4 Decentraland

Decentraland is an online platform that involves a marketplace and provides an environment to users in which they are represented by avatars. Decentraland uses ETH to track digital land and creates an ecosystem that allows users to create, share, and trade goods. A comparison to the metaverse is provided in Figure 6.

Decentraland supports social factors and economic values for the greater good. It lacks considering technical aspects because it is, so far, not fully connected to other platforms making aspects such as persistence or the connection to social media difficult to realize. For supporting cyber security, Decentraland would need to allow users to decide about the storage of their data. Visual verification and checking for the realness of created content are so far not incorporated. Further, Decentraland is browser supported but is not connected to VR or AR, thus it does not integrate body sensors. This leaves immersion weakly pronounced.

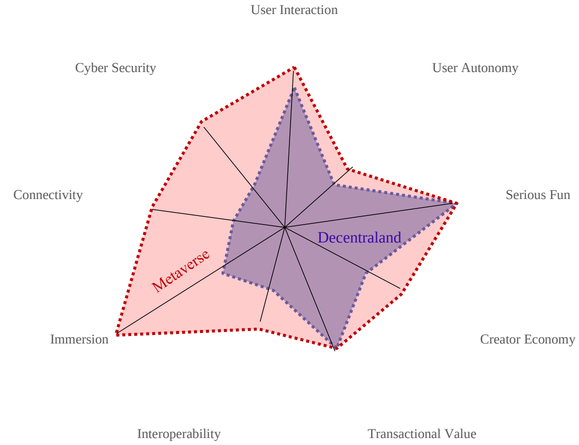

Figure 6: Decentraland

4.2.5 Spatial

The last example we present is Spatial. Spatial is a platform that focuses on connecting users and supporting their collaboration by allowing meetups, live events, and exhibitions. In Spatial, users can create their own contents. A comparison of Spatial and the metaverse is given in Figure 7.

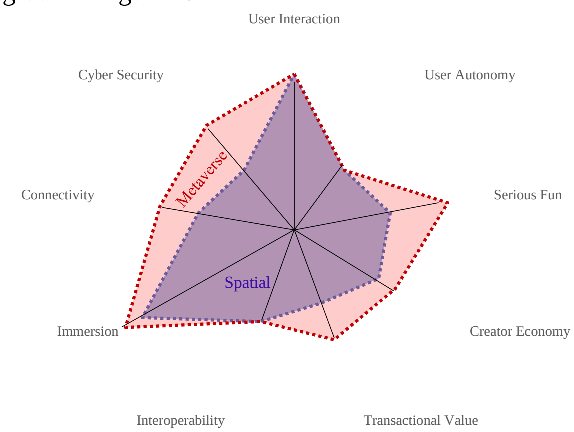

Figure 7: Spatial

The visualization indicates that Spatial is quite close to what we have characterized as a metaverse platform. All characteristics of user interaction are supported by Spatial. In Spatial, it is, for example, possible to scan the user's face allowing for a representation of users that is close to reality. Additionally, Spatial allows for the creation of own products by offering rooms for the construction of own NFTs. Spatial differs from the other examples as it supports immersion to greater parts. Only the integration of body sensors is, so far, not possible. Compared to the other examples, Spatial supervises user connection by limiting access to self-created rooms to invited users. Lastly, Spatial also allows for a connection with other platforms: Users can easily connect and exchange their created goods along with other platforms and users.

5. Discussion and Contributions

We started our paper with the question of how close we are in realizing a holistic metaverse platform. The goal of our work was to characterize metaverse platforms from a practitioner's perspective (RQ1) to compare and discuss different examples that claim to have realized a metaverse (RQ2). In our theoretical background, we demonstrated that research still struggles to define the metaverse. Our practitioners present another view to us regarding the design of metaverse platforms leading us to a combined typology of metaverse characteristics. To this end, we want to discuss the results of our paper. Figure 8 provides an overview of all compared examples.

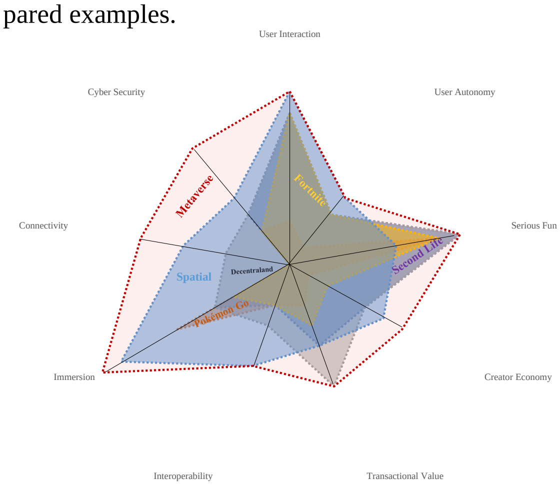

Figure 8: Comparing Metaverse Examples

In most cases, the metaverse is described as a real world that is transferred into a virtual one (Stephenson, 1992). We should critically discuss what a real-world experience is and if it is useful to transfer every real-world experience into a virtual environment. Most of the examples still reflect components of a game aiming to make an online experience more engaging and fun. Other characteristics of metaverse examples are still not fully considered, such as interoperability, cyber security, and user autonomy.

We can observe that our examples diverge in their designs to account for different focal features. Fortnite, Second Life, Pokémon Go, and Decentraland are supporting almost or all characteristics of serious fun and user interaction. Spatial and also Pokémon Go are very good in supporting immersion on a metaverse platform. This indicates an early manifestation of platform oligopolies. Similar market developments could be observed in other related platform types, like social media. Even though technical capabilities would enable a single platform to account for most of the platforms' main features, we see that certain platforms adapt to offer unique service propositions. Facebook, for example, focusses on connecting users privately, while LinkedIn aims to create professional leads. Snapchat, however, promotes data sovereignty (posts are deleted after viewing and screenshots are reported) while TikTok focusses on making short videos as "viral" as possible. Further, it can be observed that users do not want to share content of different nature on one single platform (D'Souza, 2021). This means that users hesitate to share their vacation pictures on LinkedIn or their new job postings on TikTok. Observing this trend of diverging foci in platform orientation early on in metaverses brings us to assume that the market might saturate in a multi-metaverse equilibrium.

The missing representation of some metaverse characteristics can be explained by referring to the general requirements of a metaverse platform. A metaverse platform is the central point of control: every transaction, interaction, and activity between a user's avatar and a company or platform owner is connected through the metaverse platform (Duan et al., 2021). It facilitates the coordination and efforts of buyers and sellers, thus of users, their avatars, and organizations. All these transactions involve data, a strategic resource for all involved stakeholders, in turn enhancing the value of a metaverse platform (Papagiannidis et al. 2008). However, we have to critically reflect if we are able to fully realize the vision of a metaverse platform. All of our interviewees mentioned that we still have to face some challenges to establish metaverse platforms: New questions will arise about the amount of data that can be transferred, managed, and stored (IP7, IP9, IP30). To date, the global cloud storage volume involves 1024 petabytes of data. A metaverse platform will require a lot more data, much of which will result from the integration and interaction of diverse technologies, such as VR/AR technology, blockchain, avatar interaction, integration of social media platforms, etc. Hosting and handling a metaverse platform will require significantly more effort than organizing traditional two-sided market platforms (e.g., Airbnb). A metaverse involves many different complementors and platform owners, as well as a large number of users.

Furthermore, establishing blockchains and the resulting decentralized transactions in the metaverse will require a more detailed analysis of the legal aspects. Typically, a blockchain is platform software that matches the demand of different organizations (Duan et al, 2021). With metaverse platforms, blockchain technologies (e.g., NFTs) have initiated new discussions involving smart contracts to determine a token's originality and to support designers in protecting their work to counter digital duplication (Urquhart, 2016). All of our interviewees agreed that supporting security aspects in relation to metaverse platforms will be crucial for its support and acceptance by users. This includes analyzing aspects, such as trust, user acceptance, and motivational issues, that is, the degree to which interacting in a metaverse is engaging, motivating, and satisfying.

Another focus we need to discuss is the role of users in a metaverse. For some, it is still scary and blurry to act in a virtual world similarly to the real world. Others welcome the metaverse but perceive it as a game and consider it to be an entertaining experience. If we believe in the capabilities of Metaverse platforms, users will offer more and another kind of data to organizations, increasing the necessity to protect them. This underlines the essentiality of a data security concept to ensure users are interacting in a safe virtual environment. Additionally, once metaverses are fully established in society, we will have to determine how to address health-related issues. Acting in a virtual world can have a permanent impact on mental health, including the addictive behavior of users. All of our interviewees indicated the likeliness that online behaviors will impact offline user perceptions, such as gender roles, prejudices, and offline social interactions. Research will need to address these pressing topics and discuss solutions and mitigations in more detail. Allowing for user interaction is only fruitful if interaction happens on a mentally healthy level.

Overall, we can observe that many of the existing metaverse examples originate in the gaming world or involve a high level of user immersion. However, we must question if these kinds of examples will be prevalent in determining our online economies. All of our interviewees referred to examples that they are using in their work settings. Those organizations struggle to realize their metaverse platforms for serious business activities that require to overcome the limitations of real life. For example, some of our interviewees (IP11) mentioned that they use metaverse solutions to overcome the limitations of working from home (e.g., not knowing what other coworkers are doing and not having the possibility of interacting with them efficiently). Although this example does not reference all characteristics of a metaverse platform, it demonstrates that there are use cases and examples that are connected to a meaningful and serious purpose that assist in overcoming real-world limitations. Thus, we want to advocate for research to focus on situations and opportunities for metaverse platforms that might not fulfill all characteristics overcome the limitations of currently existing platforms to support meaningful user interaction and new ways of commercialization.

With our work, we provide theoretical and practical contributions: From a theoretical perspective, we shed light on the characteristics and examples of a metaverse platform by presenting what we named the Metagon. With our Metagon, we can categorize and visualize each metaverse platform that already exists and that will be created. Additionally, we provide an orientation to researchers on future research avenues to advance the understanding of the nature and meaning of metaverse platforms. From a practitioner's perspective, we stipulate an overview of the basic characteristics of metaverse platforms and, thus, offer guidance to create own metaverse platforms.

6. Limitations and Future Research

Our work has some limitations that provide room for future research. First, we did not evaluate our typology which we plan to execute in more detail in the next step. Second, in our work, we did not present all existing metaverse examples. For instance, we disregarded Meta's Horizon because we still lack all relevant information regarding its design. Third, we did not present challenges about the design of metaverse platforms. However, future research should discuss existing challenges for each of the characteristics we present in our work. As reflected in our discussion, we still need to establish hurdles and difficulties because, so far, no example exists that fully represents metaverse platforms questioning whether it will be possible, feasible, and desireble to realize the full potential of a combined, holistic metaverse platform.

7. Conclusion

The goal of our study was to get a better understanding of metaverse platforms from a practitioner's perspective. So far, both research and practice struggle in describing what a metaverse platform is or will be. We used 30 interviews with practitioners enriched by past literature to derive a typology we call the Metagon. We used this typology to discuss different metaverse platform examples. The results of our study demonstrate that there is not one metaverse platform. Additionally, each of the platforms we analyze has a different focus, e.g., either supporting more game-like components or concentrating on the support of an immersive real-world experience. However, a true metaverse platform combines different aspects and involves a new kind of e-commerce. The journey of understanding the nature of metaverse platforms is not completed. However, with our work we provide some clarity to research the characteristics of metaverse platforms and present a typology that allows us to analyze existing platforms and to also to design and develop new ones.

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