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# Customer Service Ethics in the Metaverse: A Value-Sensitive Design Science Approach

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**ABSTRACT**

The aim of this paper is to develop recommendations for the value-sensitive design of social virtual reality (VR) applications with respect to the interaction between customers and customer service representatives, considering the value-sensitive design approach. Based on a systematic literature search, 125 relevant hits could be found, which especially assigns the values of openness, security, and liability to problems and categorizes them into six problem areas. These values of openness, security, and liability and problem fields form the requirements for a value-sensitive design of social VR applications. Based on these requirements, preliminary design principles were derived in two evaluation cycles, each assessed using an online survey (Survey 1 with 221 participants and Survey 2 with 310 participants) and presented in the form of instantiation. One main finding of the paper can help counteract discrimination in social VR applications within the interaction between customers and customer service representatives.

**KEYWORDS**

Metaverse; social virtual reality; customer service; ethic; value-sensitive design; design science research

## 1. Introduction

The metaverse, which offers the potential to change fundamental aspects of our lives, describes the vision of a persistent, immersive, and collaborative virtual world that can be entered into through avatars (Mystakidis, 2022). The use of immersive technologies such as augmented reality (AR) and virtual reality (VR), which can be grouped under the term extended reality (XR), are examples of ways people (e.g., customer) can access this world (Dwivedi et al., 2022). With the help of these technologies, users can enter worlds through the use of avatars (Cheng et al., 2022). In doing so, the metaverse enables real-time user communication and dynamic interaction with virtual artifacts. Currently, the metaverse is still in its infancy, but it has the potential to evolve in the coming years. As of 2026, a quarter or more of users (e.g., customers) will typically spend 1–2 h a day interacting in a metaverse in housing, education, commerce (Gartner, 2022), or customer service (Loveys et al., 2022). For this reason, companies are encouraged to consider the use and benefits of the latest technology (metaverse) in terms of communication, customer engagement as well as customer service (Gursoy et al., 2022).

However, operators of current social VR applications (e.g., in the context of customer service), considered as precursors of the metaverse, are currently under criticism due to ethical concerns. They are accused of creating lawless spaces that provide breeding grounds for hate, violence, and racism (Blackwell et al., 2019b; Freeman et al., 2022). With this in mind, the OASIS consortium is committed to establishing ethical standards for the design of social VR applications (OASIS consortium, 2021). The acronym OASIS stands for the human values of openness, liability, security, innovation, and sustainability (OASIS consortium, 2021). Basu (2022) states that the aim is to create a defensible social VR application in which new ideas for interaction, collaboration, and togetherness can be lived, free from the risk of hateful and harmful attacks (e.g. in the context of customer service). In addition, Smith et al. (2023) describe that potential annoyances in social VR applications can have a very intense impact on the user (customer). Abilkaiyrkyzy et al. (2023) suggest the necessity of considering the values of openness and security for a disruption-free and protected social VR applications. At the same time, there is a need to develop regulations for the value of liability in social VR applications (Qu, 2022).

Previous research (e.g., Abilkaiyrkyzy et al., 2023; Qu, 2022) only considers isolated studies with regard to the values of openness, security, and liability, so there is a need to consider the values of openness, security, and liability in the design of social VR applications in the context of customer service. In addition, previous studies on VR focused predominantly on operational use and examined use cases in the field of education (Ahuja et al., 2022; Jensen & Konradsen, 2018; Wohlgenannt et al., 2020), healthcare (Chang et al., 2020; Flavián et al., 2019), tourism (Kim et al., 2020; Yung & Khoo-Lattimore, 2019), manufacturing industry (Radkowski et al., 2015), or gaming industry

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(Hamari et al., 2019). The discipline of information systems has used value-sensitive design in other contexts so far. For Vom Brocke et al. (2009), value-sensitive design involves an analysis to evaluate the various business challenges in order to find out the extent to which an information technology can benefit the respective project. To fill this research gap, this paper sets out with the goal of developing recommendations for the value-sensitive design of social VR applications with respect to the interaction between customers and customer service representatives. This will be done by taking into account the value-sensitive design approach, which is currently gaining attention in information systems research. This approach provides for a consideration of human values of openness, security, and liability already in the design of information systems (Jacobs & Jacobs, 2022).

Based on previous studies (e.g., Abilkaiyrkyzy et al., 2023; Jacobs & Jacobs, 2022; Qu, 2022), the relevance of research regarding the values of openness, security, and liability for social VR applications in the interaction between customers and customer service representatives for the design of a value-sensitive application is evident. Against this background, this research study decided to focus on the values of openness, security, and liability for social VR applications in the context of customer service and identified the following research question (RQ), which will be answered in the course of this paper:

RQ: Which design principles with respect to openness, security, and liability for social VR applications regarding the interaction between customers and customer service representatives can enable value-sensitive use?

## 2. Theoretical background

### 2.1. Social virtual reality and customer service

According to Mystakidis (2022), social VR describes a foundation based on state-of-the-art technological solutions, consisting of a multisensory interface with a variety of spaces (e.g., for customer service), digitized elements (avatar) and human characters (customer or customer service representative). This multitude of spaces within social VR enables interaction between customers (Mystakidis, 2022) and customer service representatives in the context of customer service. Here, Barreda-Ángeles and Hartmann (2022) state that we can already find many areas of application in social VR today, such as online shopping (Kumar, 2022), travel (Monaco & Sacchi, 2023), or customer service (Teng et al., 2022). In terms of customer service, this application can be understood as a combination of VR and social media, which represents a kind of spatial area in social VR in order to conduct customer interactions via headsets with a corresponding customer service representatives (Barreda-Ángeles & Hartmann, 2022). The use of VR headsets blocks perception of the real environment, creating an immersive experience (Mostajeran et al., 2023). As a result, social VR applications (e.g., customer service environments) can evoke a particularly profound sense of presence in users (customers), creating the sensation of physically being a part of the virtual space design. In this context, the use of VR-assisted location, the use of spatial forms of representation, and an expanded field of perception promote a sense of presence. Through the self-created and realistic avatars, there is a strong embodiment of social interactions, which can reflect a real human (customer) to human (customer service representative) exchange (Barreda-Ángeles & Hartmann, 2022). In addition, Visconti et al. (2023) state that an avatar represents the connection between one's own personality (customer) and another user (customer service representative) and that the avatar transfers one's own actions and personality to social VR. In this context, realistic avatars can be seen as the most effective representation technology (Visconti et al., 2023) and lead to avatars being used in social VR (Sun et al., 2023). At the same time, social VR platforms not only allow customers to interact in a much more flexible way compared to traditional visual display forms, they also allow customers to use social interaction capabilities in the form of gestures and physical contact (e.g., direct physical touch) (Barreda-Ángeles & Hartmann, 2022) while communicating with a customer service representative.

### 2.2. Value-sensitive design

Value-sensitive design (VSD) intends to integrate the corresponding values of openness, security, and liability from the very beginning as well as within the entire design process that a technology (e.g., social VR applications with regard to the interaction between customers and customer service representatives) goes through (Gazzaneo et al., 2020). The word "values" cannot be delimited to a few defined values of openness, security, and liability, but instead stands more generally for what a person (customer) or (customer) group perceives as important (Borning & Muller, 2012, p. 1). These individuals or groups may be users of the technology, designers, or other stakeholders. There are values of openness, security, and liability that are more often important in the context of technology. The values of openness, security, and liability can include, for example, the common good, wealth, protection of personal identity, respect, personal independence from bias, trustworthiness, or a sense of responsibility. However, there is no complete set of important values, as certain values of openness, security, and liability may be technology-oriented or only identified as such during a process (Gazzaneo et al., 2020). The VSD approach represents a methodology that integrates conceptual, empirical, and technical inquiry. Conceptual inquiry describes a philosophically informed analysis of the subject matter in terms of potential values of openness, security, and liability and issues to be identified. However, this does not necessarily have to be done through costly empirical analysis-thoughtful consideration by those involved as to which values of openness, security, and liability are relevant with respect to the technology can also be quite purposeful. Empirical investigations are based on the conceptual analyses and supplement it with investigations using questionnaires or surveys to determine how well the determined

values of openness, security, and liability fit the relevant technology. The technical investigations aim to find out whether the technology itself provides possible restrictions for the previously defined values of openness, security, and liability or whether it even supports some values of openness, security, and liability (Friedman & Kahn, 2000).

## 3. Research method and materials

In order to answer the research question that arose in the context of this paper, the Design Science Research approach (DSR) according to Peffers et al. (2007) was used. This methodology involves the creation as well as evaluation of artifacts, which in turn can be used to solve identified problems (Hevner et al., 2008). As can be seen in Figure 1, the approach can be reduced to six main phases, some of which are iterated throughout the process.

The first step of the DSR approach is to identify the problem. For this, a systematic literature search was conducted according to Page et al. (2021) and Reddit posts were analyzed using a scraper. For systematic literature searches using heterogeneous research methods that consider the use of both qualitative and quantitative approaches, the PRISMA 2020 principles have illustrated their practical applicability (Page et al., 2021). The guideline consists of four steps: *identification*, *screening*, *eligibility*, and *included*. We also used screening and quality assessment tools, such as AMSTAR, Dedoose, Distiller SR, ROBIS, and SRDR, to comply with the PRISMA guidelines (Balcerzak et al., 2022; Bugaj et al., 2023; Kovacova et al., 2022; Zvarikova et al., 2023). To visualise the data material, dimensions were used which, in conjunction with VOSviewer, functioned as a layout algorithm for co-authorship (Figure 2), citation (Figure 3), bibliographic coupling (Figure 4), and co-citation (Figure 5) (Balcerzak et al., 2022; Bugaj et al., 2023; Kovacova et al., 2022; Nan et al., 2023; Zvarikova et al., 2023).

The first step, identification, involved searching for relevant articles using the following search string: *("social VR" OR "social virtual reality" OR "multi user VR" OR "multi-user VR" OR "multi user virtual reality" OR "multi-user virtual reality" OR "metaverse") AND ("consumer experience" OR "customer experience" OR "customer satisfaction" OR "customer service") AND (values OR ethics OR sustainability OR risks OR acceptance)*. To limit the number of results in the search phase, the analysis to identify related papers was restricted to their titles in the databases or libraries and publishing platforms Web of Science, Scopus, Google Scholar, ScienceDirect, AISel, WiSo, IEEE Xplore, and ACM Digital Library. In this study, we used these libraries and publishing platforms because, following Robins (2022), they represent a suitable starting point for literature searches. When searching the databases, libraries and publishing platforms, 7154 scientific papers were identified. Subsequently, these articles were checked for duplicates and 4805 duplicate articles were removed.

In the second step screening, the 2349 identified scientific publications were checked for eligibility for this research study: The title and abstract of the publication had to be in English and written after 2017 in order to be included in this study. Studies published before 2017 or written in a language other than English were therefore excluded.

The third step, eligibility, involved a title, abstract, and full-text review of the 1053 remaining publications. To be accepted for this research study, the publication had to focus on social VR or metaverse and customer service, and the contribution had to relate to the areas of openness, liability, and security. Publications from another XR area or not related to customer service were excluded. In addition,

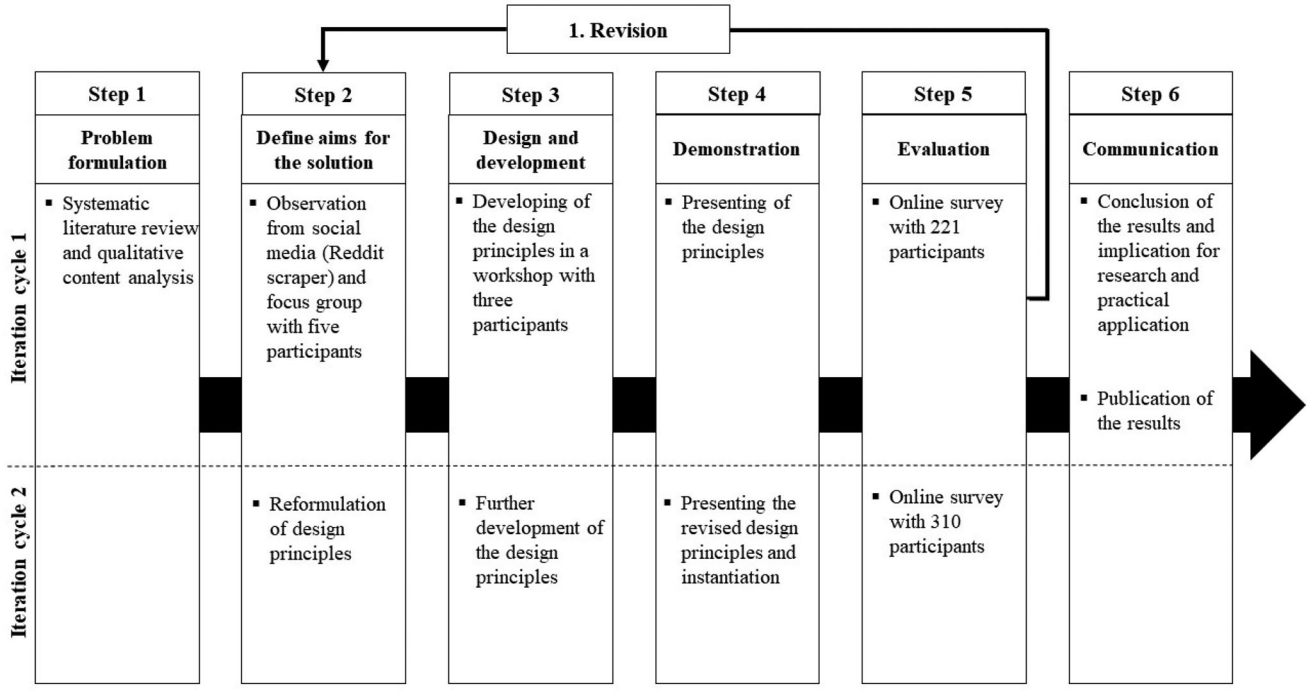


Figure 1. DSR approach according to Peffers et al. (2007).

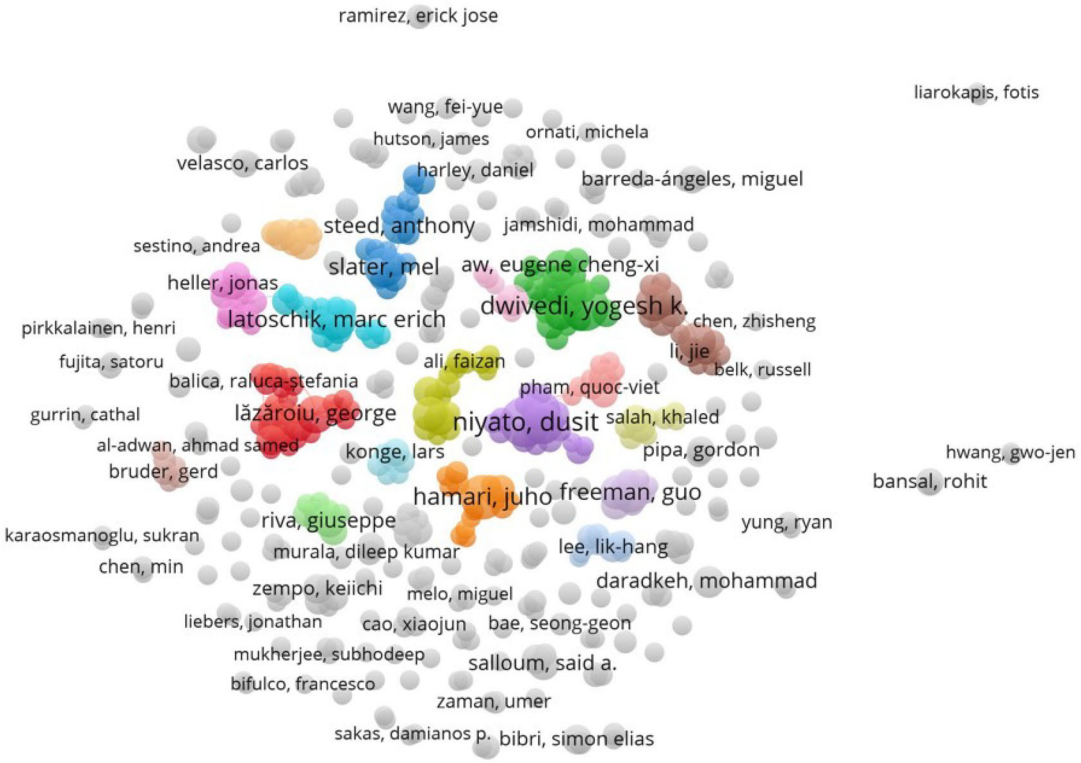


**Figure 2.** Co-authorship of the authors.

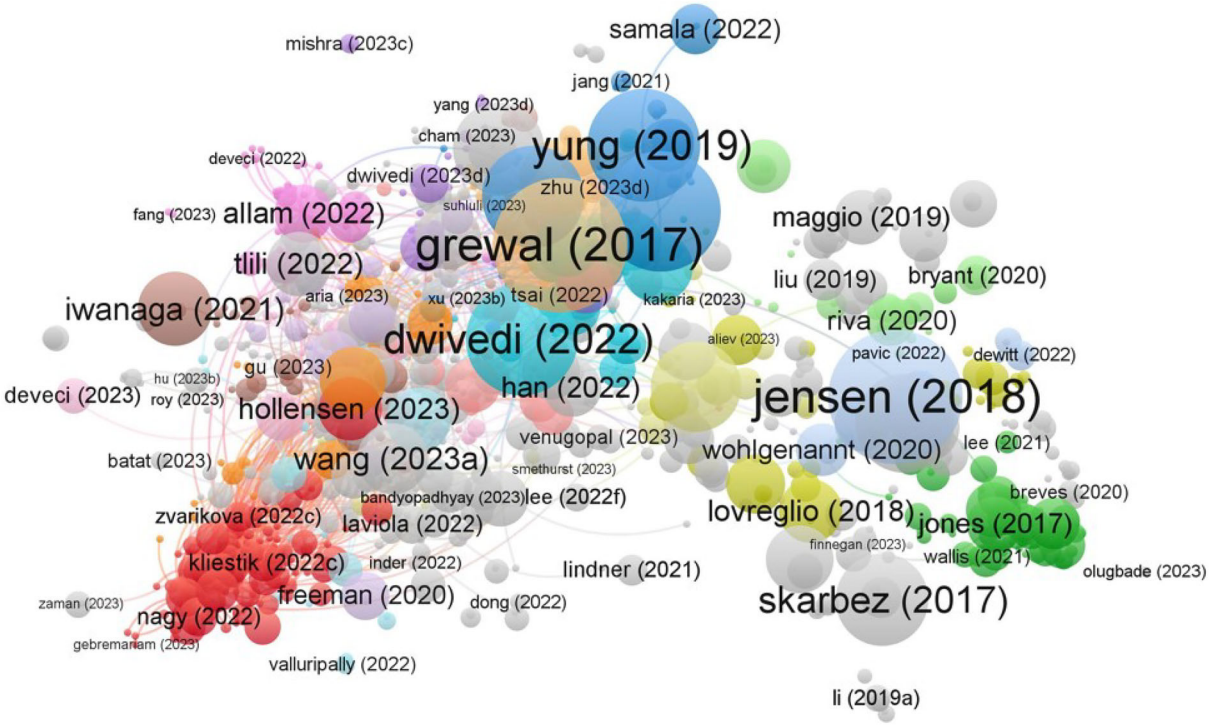


**Figure 3.** Citation of the documents.

articles relating to other areas that are not related to the human values of openness, security, and liability were excluded.

In the final step, included, the 121 identified scientific papers were subjected to a forward and backward search, which led to a further four articles. In total, 125 articles were identified as relevant. The entire process of the systematic literature review is shown in Figure 6.

From the inclusion criteria, it is clear that this research paper referred to problems from the dimensions of openness, liability, and security. In order to clearly define and delineate these from each other in the following, a category

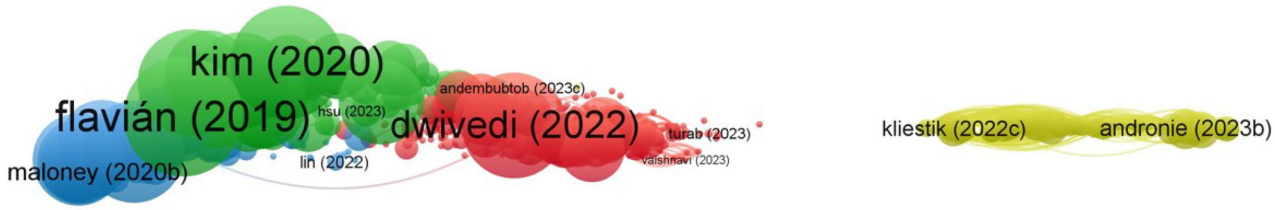


**Figure 4.** Bibliographic coupling of the documents.

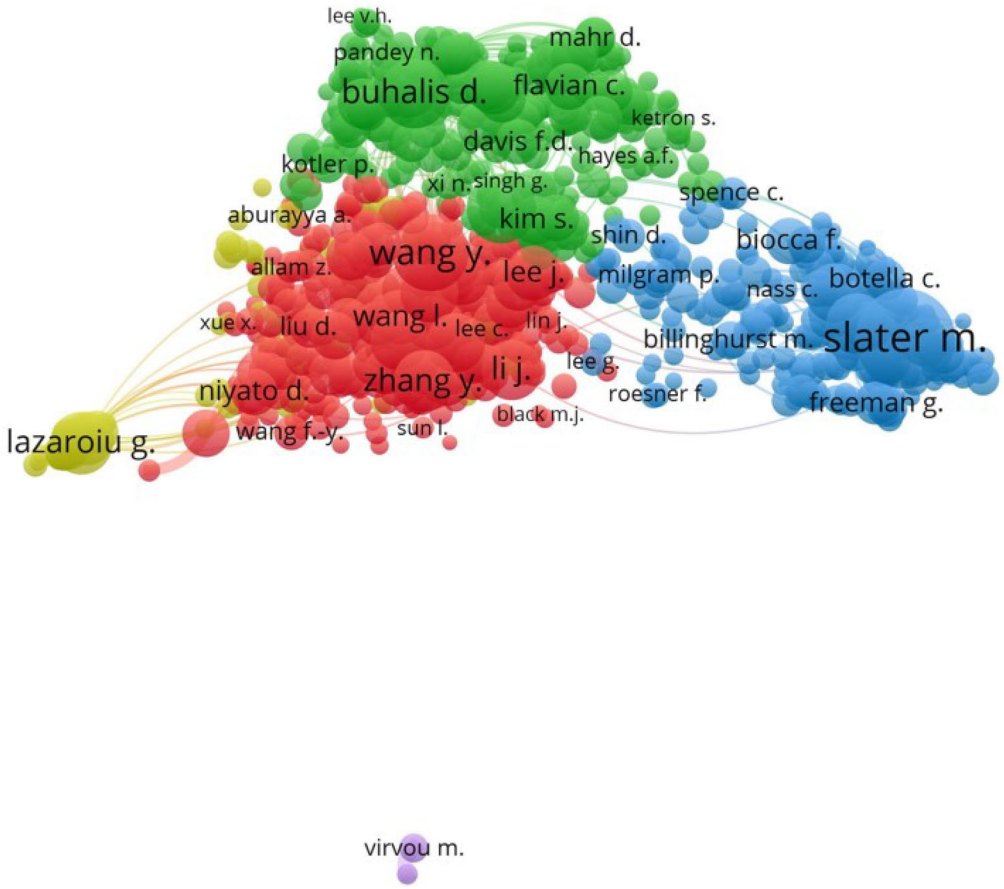


**Figure 5.** Co-citation of the cited authors.

system was created according to Mayring (2015), which belongs to the topic area of qualitative content analysis (more information is available in the Appendix Table A1). Building on the identification of these problem areas in the first step, they were tested in step two for relevance by a Reddit scraper on the one hand and manifested in the context of a focus group on the other. According to Parker and Tritter (2006), the focus group methodology is an appropriate approach for investigating and evaluating qualitative research contexts. The focus group consisted of five scientific participants who have experience with AR and VR technology. With respect to the Reddit scraper, several search strings were created for each problem field. The goal was to check how often each problem field was mentioned on Reddit. The scraper goes through each subreddit with two loops. In order for the scraper to have the most efficient runtime, the focus was on the largest three metaverse subreddits. These are the r/metaverse, r/recroom, and r/VRChat subreddits. In each of these subreddits, the last 10,000 posts were then checked. With another loop, the scraper goes through each comment in each post. Here, the scraper checks to see if there is a match with any of the search strings. Matches are counted individually for each problem area.

Following Wambsganss et al. (2021), in the third step, design principles were developed from the problem areas and discussed in a workshop (Schömig et al., 2020) with three scientific participants and consolidated using literature and existing social VR applications.

In the context, the resulting design principles form the artifact of this paper.

In order to assess the results, an evaluation of the design principles was conducted in each case in the context of an online survey using the open-source software LimeSurvey. For this purpose, based on the guidelines of Nobata et al. (2016), a questionnaire was created in LimeSurvey. In each case, the different design principles were introduced and an evaluation was performed using the following criteria:

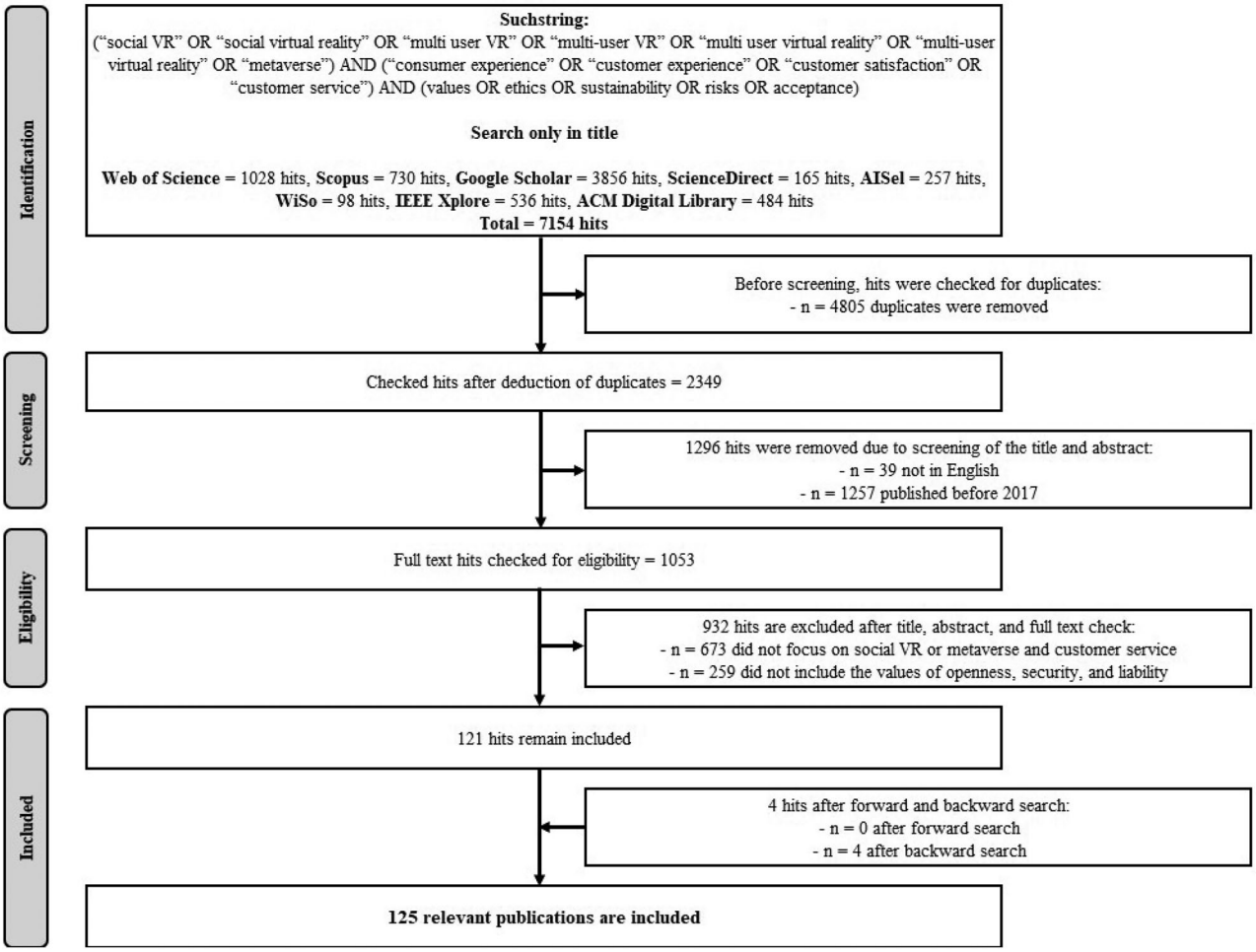


**Figure 6.** Process of systematic literature review according to Page et al. (2021).

understandable (ability to be understood), relevance, usefulness, and effectiveness. We were guided by Venable, Pries-Heje, and Baskerville (2016) in selecting the four criteria for evaluating the design artifact. Using a Likert scale for their responses, the participants were asked about each design principle and category. In the case of the scales, the response options are ranked so that statistical evaluations are possible on their basis (Raab-Steiner & Benesch, 2015). The Likert scale chosen was a five-point scale with values between 1 and 5 (1 = "lowest agreement" to 5 = "fullest agreement"). Furthermore, a free text field was provided for each design principle to give participants an opportunity for further comments. In addition to the questions regarding the design principles, personal information such as age, gender, or occupation was also requested. This was done in order to draw possible conclusions during the statistical analysis, for example, whether age or gender had an impact on the participants' answers. However, care was taken to preserve the anonymity of the participants, so no questions were asked that directly identified a person. The target audience for the survey consisted of individuals of all ages and genders who have experience using social VR applications. For this reason, the first survey within Evaluation Cycle 1 was shared on the Prolific platform and on various Reddit VR forums. It was published on the forums "r/RecRoom," "r/VRChat," "r/BigScreen," "r/OculusQuest," "r/Oculusdev," "r/virtualreality," "r/metaverse," "r/oculus." During Evaluation Cycle 2, the survey was shared on the Prolific platform and with students at the University of Osnabrück. The mean and standard deviation were determined. How positively or negatively a design principle was perceived by the participants could be determined by the mean. Based on this, the iterative jump back to step two was then made to reformulate the design principles. The principles that emerged from this reformulation form the final artifact of this research paper. At the same time, we developed an instantiation based on the reformulated design principles. The evaluation of the final artifact was done here as previously described.

Finally, the main implications, limitations, and a research outlook related to the communication of the results are presented.

## 4. Derivation of design knowledge

### 4.1. Problem identification

Through the literature review, issues were identified particularly regarding the OASIS values of openness, security, and liability, and to social VR in terms of interaction between customers and customer service representatives.

In psychology, *openness* has synonyms such as intelligibility, open-heartedness, or tolerance. In the case of social VR

**Table 1.** Problem fields.

| Value | | | |
|---|---|---|---|
| # | Problem (number of Reddit hits) | Sub- dimensions | Sample |
| Openness | | | |
| L1 | Harassment (84) | Verbal harassment | "He deserves to die from the coronavirus by just looking like that [reference to his avatar]. That avatar is lame as f**k, who the f**k has a 1D avatar, haha." (Maloney et al., 2020a, p. 7) |
| | | Physical harassment | "Also other avatars were getting very close to me, "almost touching," and I felt very uncomfortable that they were not respecting my space (even I know it was just virtual space)." (Moustafa & Steed, 2018, p. 7) |
| | | Environmental nuisance | / |
| L2 | Discrimination (14) | Age | "Minor: I'm trying to figure out how to show certain avatar, do you know how to do that?<br>Adult 1: Oh you're new to VRchat, oh you better watch out. There's a lot of stuff kids shouldn't see on here.<br>Adult 2: yeah all types of stuff!<br>Minor: like what?<br>Adult 1: hmm like VR rape. It's serious. I got raped the other day … haha (being sarcastic)<br>Minor: What's VR rape?<br>Adult 2: It happens when someone comes up to you really close and then (adult proceeds to hump and make sexually explicit movements on this child's avatar and then laughs).<br>Minor: oh this is weird … (moves backward and changes to a different topic)." (Maloney et al., 2020a, p. 7) |
| | | Gender | "I used to only use female avatars. Also if I'm talking to one of my friends, I tend to get more attention than usual because people realize that I'm female. A lot of people will approach me and start talking to me and I'll just stay quiet. I'll turn my mic off and just pretend that I'm either a guy or that I don't have a mic. This is annoying so I'm glad that I can use other ways to communicate without voice." (Maloney et al., 2020b, p. 17) |
| | | Origin | "With English being the predominant language in social VR, if you do come in with an accent, people may harass you. Or at least, there will be some stigma, some kind of tribalism where people only want to hang out with people who speak the same language and who come from the same country, not you. So an easy solution is not to speak." (Maloney et al., 2020b, p. 17) |
| Security | | | |
| L3 | Identity related threat (0) | Impersonation attacks | "With the rise of the metaverse [ … ] proving and protecting your identity will be crucial. That's especially important if you are someone who attaches a lot of value to their personal brand, such as an artist, sportsperson, or corporate executive." (Finance Feeds, 2021, p. 1) or customers. |
| | | Identity Theft | "It seems reasonable to expect, with all the money pouring into Metaverse projects, that cyber criminals will be attracted into this space; one might call them Metacriminals. We should expect our carefully chosen avatar identity to be at risk to Metacriminals, not to mention our portfolio of virtual property, tokens and our other Metaverse assets." (Medium, 2021, p. 1) |
| L4 | Network related threats (0) | Cyberattacks | "[ … ] The metaverse, on the other hand, is likely to bring entirely new cyberattacks, in addition to the conventional phishing, malware, and hacking, due to its architecture. [ … ]" (Analytics Insight, 2022, p. 1) |
| L5 | Data security related threat (29) | Unclear data management | / |
| Liability | | | |
| L6 | Lack of legal system (243) | Lack of laws | / |
| | | Lack of punishment systems | "You couldn't tell who was making those comments, so it wasn't very easy to report them. You can kind of hear everyone around you, so it's hard to know, 'Oh, it's this person, I should mute them.' It was one person making a bunch of really obnoxious, awful comments, but I ended up just muting the whole audience." (Blackwell et al., 2019a, p. 16) |

in relation to the interaction between customers and customer service representatives, this can be related to how open-minded different users (customer service representatives or customers) are and the extent to which users interact with each other in an ethical manner. In the literature, two sub-dimensions in particular could be identified, which currently pose a problem in this regard: Harassment (*Problem 1*) and Discrimination (*Problem 2*). These problems are caused by the fact that in social VR, a large number of people come together and thus large differences arise, e.g., in the age, origin, gender, or sexual orientation of the users. Shriram and Schwartz (2017) found that two out of seven women and 21 out of 99 men have been exposed to harassment and 42% have already observed such harassment in social VR. In this context, harassment in social VR related to the interaction between customers and customer service representatives can be divided into several categories: (1) verbal harassment (by hearing) (Blackwell et al., 2019a; Hine et al., 2023; Jicol et al., 2022), which occurs through text or voice tools (e.g., insults or sexual innuendos during the interaction between customers and customer service representatives); (2) physical harassment (by feeling), which is performed by the avatar (e.g., sexual gestures or unwanted touching during a customer interaction with a customer

service representative) (Blackwell et al., 2019a; Hine et al., 2023; Jicol et al., 2022) and (3) environmental harassment (by sight) such as showing sexual and violent content or sexual gestures (e.g., while a customer is interacting with a customer service representative) (Blackwell et al., 2019a; Jicol et al., 2022). Discrimination is especially prevalent among marginalized groups such as lesbian, gay, bisexual, transgender, and queer individuals or ethnic minorities. In addition, potentially discriminatory and condescending statements are primarily voiced by male users of social VR (Paul et al., 2019), for example, during a customer's interaction with a customer service representative. While in traditional social media applications or virtual worlds anonymity protects customers or customer service representatives from discrimination, in social VR they have avatars that are designed to resemble gender, ethnicity, skin color, and facial features. This, along with the combination of full-body tracking and voice chat, leads to these groups being strongly identifiable (Freeman et al., 2022) in the context of customer service. Furthermore, the immersive embodiment and presence of avatars can make harassment and discrimination (e.g., within a customer interaction with a customer service representative) feel more intense compared to traditional social media platforms, and can have the effect of making someone feel more personally targeted (Blackwell et al., 2019b).

The second value is *security*. The users of social VR regarding the interaction between customers and customer service representatives are exposed to various security risks, which can be classified into the following sub-dimensions: (1) identity-related threats (Lin & Latoschik, 2022; Nath, 2022; Wang et al., 2023), (2) network-related threats (Nath, 2022; O'Brolcháin et al., 2016; Wang et al., 2023), and (3) data security-related threats (Kulal et al., 2022; Sun et al., 2022; Wang et al., 2023). *Problem 3* (identity-related threats) refers to identity-related risks during an interaction between customers and customer service representatives. Identity management plays a crucial role in this context. Identities (e.g., of customers) can be stolen, which can damage digital assets or social relationships (Lin & Latoschik, 2022; Nath, 2022; Wang et al., 2023). As a result of these opportunities of stealing virtual identities, these intrusions can negatively impact and deeply imprint customers' real-world awareness (Nath, 2022). Impersonation attacks can also occur, where the attacker pretends to be another authorized entity (during a customer interaction with a customer service representative) in order to gain access to certain services and systems (e.g., from the customer) (Wang et al., 2023). Chang et al. (2022) suggest that in metaverses within customer service, gestures and emotions are readily used because they have a high probability of identity theft and misuse. *Problem 4* (network-related threats) refers to risks regarding the Internet during interaction between customers and customer service representatives. Data manipulation by attackers may occur, disrupting the normal activities of users (customers), avatars, and physical entities. For example, these may be distributed denial of service attacks, causing network outages and unavailability of services (Wang et al., 2023) within a customer interaction with customer service representatives. *Problem 5* (data security-related threats) deals with issues that may arise through big data collection during use (Sun et al., 2022). Through social VR regarding the interaction between customers and customer service representatives, a lot of new data (e.g., concerning eye movements or facial expressions of customers) could be collected, which is currently not collected to this extent (Kulal et al., 2022; Sun et al., 2022). Therefore, new challenges arise in the collection, management and storage of this data (Sun et al., 2022). It is not clear who is responsible for collecting, storing, securing, or destroying this data. There are also questions about which personal data from the customer is produced and transmitted in real time, such as biometric information, daily routines, or habits (Sun et al., 2022; Wang et al., 2023). Other questions concern who this data is shared with, under what conditions, and for what purpose (Kulal et al., 2022; Wang et al., 2023).

Regarding the value of *liability*, it is necessary that, as in the real world, there are social rules and norms that govern the interactions between avatars (customers and customer service representatives) (Hennig-Thurau et al., 2023; Johan, 2022). In this regard, a lack of a legal system (*Problem 6*) poses a problem: First, it is difficult to say whether a virtual crime in social VR should be considered in a similar way as a crime in real life in terms of the interaction between customers and customer service representatives. Verbal abuse in real life and social VR can both be classified as verbal harassment (Brick et al., 2022). New crimes, such as virtual stalking in social VR, need to be reconsidered by lawmakers (Hedidi, 2023). Second, a system needs to be created that properly punishes errant behavior (Tanaka et al., 2023; Wang et al., 2023) in the context of a customer interaction with a customer service representative. The following table shows these problem areas with the sub dimensions and a selected example from the literature or from online articles (Table 1). The number of Reddit hits is also shown. A higher number implies a greater occurrence of the topic and thus relevance on Reddit.

### 4.2. Design principles

These three values of openness, security, and liability and the six identified problem areas thus form the requirements for a value-sensitive design of social VR applications. Based on these findings, 10 preliminary design principles (DPs) were derived in a panel of experts to serve for value-sensitive social VR applications. These are presented in Table 2. In addition, the table shows which problem areas this DP is intended to combat (column L#). These DPs are based on the literature review, Reddit analysis, focus group, and workshop, and have a consistent structure: first, they describe which value is addressed, and consequently define an action that can solve a specific problem. Social VR applications that follow and implement these DPs should thus reduce problems in the values of openness, security, and liability.

## 5. Results

Next, these DPs were evaluated and assessed using a survey. The goal was to learn from different groups of people (cf. Section Research method and materials) and to find out if the formulated DPs were of use and whether they could help in the implementation in social VR applications with regard to the interaction between customers and customer service representatives and to take the different values of openness, security, and liability into account. The methodological approach of the survey has already been described in the Research method and materials section. The survey was completed by 221 participants in Evaluation Cycle 1, and the participants came from different nations (South Africa: 79 participants, UK: 29 participants, USA: 22 participants, Poland: 16 participants). The rest of the participants did not indicate any nationality or the nationality did not occur as frequently as those mentioned. Of these, 78 were female, 142 were male, and one diverse. The age group 22–26 occurred most frequently (63 times). The following Table 3 shows the results of Evaluation Cycle 1 of the quantitative survey as a function of the mean (ME) and standard deviation (SD) in the categories of comprehensibility, relevance, usefulness, and effectiveness. The results show that some DPs were positively received by the participants, while others were, in turn, negatively received.

DP1 was rated as average. Understandability (UN) ($ME < 4$), relevance (*RE*), usefulness (US), and effectiveness (EF) were around 3 from the mean. Participants reasoned that while a voice distortion device might work, it would bring many negative consequences. For example, children may try to sound like adults and vice versa, or attackers may continue to exhibit toxic behaviors due to anonymity. Also, people might see it as a reason to harass or bully someone if the harasser is using a voice distortion device. This DP would only be effective and useful if the voice distorter was convincing and the use of a voice distorter was not able to be detected. So, this DP can be included, but it needs a revision, which can be seen in Table 4.

DP2 has a positive result in all categories ($ME > 4$). This is justified by the fact that customizable characters give users freedom and allow them to express what they like and who they are in terms of customer service interaction. This DP should therefore be included.

DP3 is rated negatively in all categories ($ME < 4$). Pixelation is difficult to implement because it is not foreseeable as to what taboos may exist today or in the future. It is also difficult to detect these taboos automatically and accurately. In addition, pixelation would arouse curiosity in users as they would want to know what has been pixelated. Alternatively, spaces can be created where access is age-based (and adults must give consent) and parents should supervise their children. So, this DP should be revised (Table 4).

DP4 is rated as positive in all categories ($ME > 4$). A mute function is appreciated, as it can be a very simple way (e.g., with a hand gesture) to protect oneself from harassment (Freeman et al., 2022; Sabri et al., 2023). This DP should therefore be included.

DP5 was rated positively (UN, US, and EF $> 4$, $RE = 4$). For the participants in the survey, 2FA is completely sufficient. Authentication via biometric data should only be optional, as this could bring with it data protection problems (many customers do not want the system to know their fingerprints, for example). Also, 2FA should be optional as not every customer wants to go through this process before using it. So, this DP should be revised (Table 4).

DP6 was rated positively in all categories (ME $> 4$). In particular, the fact that VR headsets scan the room or record biometric customer data such as eye movements creates a lot of new data which should not come into the possession of the wrong parties. This DP should therefore be included (Table 4).

DP7 was also rated positively in all categories (UN, RE, and US $> 4$ and EF at about 4). It is important to note that such information should be presented briefly and comprehensibly and be easily accessible to the customer. The customer should also be able to opt out of having their information passed on. This DP should therefore be included (Table 4).

DP8 was found to be positive in all categories (ME $> 4$). This DP should therefore be included.

DP9 was rated negatively in all categories (UN, RE, US, and EF $< 4$). The reason given for this is that the DP is too unspecific and AI can make many mistakes. This DP should therefore be revised (Table 4).

DP10 was rated negatively (ME $< 4$). In principle, such a system can work, but it must be fair and consistent. This can only be achieved if there are trustworthy people behind this system who correctly evaluate incorrect behavior. Customers with a good score from the scoring system for good behavior from DP3 would be candidates who could be considered to act in a jury to make such decisions. An AI from DP9 can help identify some erroneous behaviors to report to this jury. So, this DP needs to be revised (Table 4).

Considering the SD, it is mainly in the range of $1.0 - 1.4$. It is noticeable that the DPs that were rated well have a lower SD than those rated poorly. It can be concluded that poorly-rated DPs have a wider spread of results, making them more controversial. Well-rated DPs with a low SD are more clear. Table 4 shows the new DP's that were either adopted (AD), revised (REV), or added entirely (NE) (Action).

In the following, Figure 7 gives an exemplary overview of the application of the new DPs in the form of an instantiation. This representation is provided as a guide for the scientific and practical community.

The online survey within Evaluation Cycle 2 was completed by 310 participants from different countries (Germany: 152 participants, South Africa: 42 participants, Poland: 33 participants, and Mexico and Portugal with 15 participants each). There were eight or less nationalities represented by the remaining survey participants in terms of their country of origin. Of these, 202 participants were male, 105 were female, and three diverse. In terms of age groups, 143 survey participants belonged to the 18–22 age group, followed by 87 participants in the 22–26 age group, and 29 participants in the 26–30 age group (position three). In both evaluation cycles, it was found that the age group 22–26 years participated most frequently in the study, which is

**Table 2.** Design principles.

| DP# | DP | L# |
|---|---|---|
| Openness | | |
| DP1 | To address the value of openness in the design of social VR applications in terms of customer and customer service representatives' interaction, a voice bias should be incorporated because this prevents characteristics of a real-life customer (such as gender) from being identified by voice (based on Blackwell et al., 2019a, 2019b; Freeman et al., 2022; Hine et al., 2023; Jicol et al., 2022; Paul et al., 2019). | L1, L2 |
| DP2 | To address the value of openness in the design of social VR applications in terms of interaction between customers and customer service representatives, customizable avatar designs should be enabled because this allows customers to freely set their appearance (based on Blackwell et al., 2019a, 2019b; Freeman et al., 2022; Hine et al., 2023; Jicol et al., 2022; Waltemate et al., 2018). | L1, L2 |
| DP3 | To address the value of openness in the design of social VR applications in terms of customer and customer service representative interaction, automatic detection and pixelation of obscene and inappropriate content should be implemented from the customer's perspective, as well as an incentive system for encouraging positive behavior (based on Blackwell et al., 2019a; Jicol et al., 2022). | L1, L2 |
| DP4 | To address the value of openness in the design of social VR applications in terms of interaction between customers and customer service representatives, a third-party mute feature should be implemented because it can stop verbal harassment (e.g., insults) (based on Freeman et al., 2022; Sabri et al., 2023). | L1, L2 |
| Security | | |
| DP5 | To address the value of security in the design of social VR applications regarding the interaction between customers and customer service representatives, a secure user authentication system (e.g., authentication via eyes or fingerprint or other biometric data (2-factor authentication (2FA))) should be implemented because this protects the accounts from unauthorized access by third parties (based on Lin & Latoschik, 2022; Wang et al., 2023). | L3 |
| DP6 | To address the value of security in the design of social VR applications in terms of customers' interaction with customer service representatives, sensitive customer data should be encrypted in the applications because this minimizes the risk of unauthorized access by third parties (based on Kulal et al., 2022; Sun et al., 2022; Wang et al., 2023). | L5 |
| DP7 | To address the value of security in the design of social VR applications with regard to the interaction between customers and customer service representatives, the information flows between social VR applications and third-party providers and the general data processing should be transparently disclosed because users will learn what information is processed and stored and how (based on Kulal et al., 2022; Sun et al., 2022; Wang et al., 2023). | L5 |
| DP8 | To address the value of security in the design of social VR applications in terms of customer and customer service representative interaction, operators and customer service representatives of social VR applications should release patches and security updates through training and attention to current security risks, because this helps to continuously maintain platform security for customers (based on Nath, 2022; O'Brolcháin et al., 2016; Wang et al., 2023). | L4 |
| Liability | | |
| DP9 | To address the value liability in the design of social VR applications regarding the interaction between customers and customer service representatives, intelligent penalty systems (e.g., artificial intelligence (AI)) should be integrated because they can support the implementation of a rights and penalty system (based on Luong et al., 2023; Tanaka et al., 2023). | L6 |
| DP10 | To address the value liability in the design of social VR applications in terms of customers' interaction with customer service representatives, moderators, juries, and formal debates should be integrated because they can contribute to effective law enforcement in the virtual space (based on Kulal et al., 2022; Wang et al., 2023). | L6 |

**Table 3.** Results evaluation cycle 1.

| | Understandable | | Relevance | | Usefulness | | Effectiveness | |
|---|---|---|---|---|---|---|---|---|
| DP# | *ME* | *SD* | *ME* | *SD* | *ME* | *SD* | *ME* | *SD* |
| DP1 | 3.72 | 1.11 | 3.22 | 1.19 | 3.41 | 1.14 | 3.38 | 1.16 |
| DP2 | 4.28 | 1.10 | 4.07 | 1.34 | 4.07 | 1.26 | 4.01 | 1.23 |
| DP3 | 3.92 | 1.13 | 3.69 | 1.20 | 3.56 | 1.27 | 3.42 | 1.36 |
| DP4 | 4.20 | 1.18 | 4.09 | 1.42 | 4.16 | 1.30 | 4.09 | 1.33 |
| DP5 | 4.25 | 1.21 | 4.00 | 1.41 | 4.11 | 1.30 | 4.14 | 1.32 |
| DP6 | 4.49 | 1.11 | 4.35 | 1.45 | 4.38 | 1.30 | 4.36 | 1.28 |
| DP7 | 4.23 | 1.10 | 4.16 | 1.36 | 4.12 | 1.26 | 3.96 | 1.27 |
| DP8 | 4.30 | 1.08 | 4.20 | 1.41 | 4.19 | 1.25 | 4.19 | 1.26 |
| DP9 | 3.57 | 1.21 | 3.34 | 1.21 | 3.26 | 1.30 | 3.21 | 1.35 |
| DP10 | 3.73 | 1.16 | 3.50 | 1.30 | 3.42 | 1.23 | 3.37 | 1.25 |

partly consistent with previous research studies (e.g. Blackwell et al., 2019b; Freeman et al., 2022). For example, the study by Blackwell et al. (2019b) showed that around half of the study participants were in the age group between 18 and 34 years, while in the study by Freeman et al. (2022) only four out of 30 participants were in the age group 22–26 years. Despite the relatively young age between 22 and 26 years and the associated possibly not yet extensive experience with customer service in social VR, the authors are of the opinion that the results of the study can make a valuable contribution in this context.

In addition, following Sarstedt et al. (2011) and Sonntag et al. (2023), a multi group analysis was carried out to test the demographic data, with a focus on the country of origin, for possible bias in the experiment. The software SmartPLS 4 was used to conduct the analysis. We compared the total of all countries of origin from the first evaluation cycle with the total of all countries of origin from the second evaluation cycle from the samples obtained. The result shows how strongly the comparison of the countries of origin of the first evaluation cycle and the countries of origin of the second evaluation cycle differs on the basis of the bootstrap estimates with 5000 samples of the path coefficients using the one-sided test (Sonntag et al., 2023). The results of the analysis show that there is no significant correlation between the countries of origin of Evaluation Cycles 1 and 2 in terms of liability and openness, liability and security, and security and openness. Furthermore, as part of the multi group analysis, we examined the countries of origin of Evaluation Cycles 1 and 2 with regard to the bias-corrected 95% confidence intervals (Sonntag et al., 2023). There was no significant relationship ($p < 0.05$) between the countries of origin of the first and second evaluation cycle with regard to liability and openness, liability and security, and security and openness. An overview of the results can be seen in Table 5.

Table 4. Revision design principles.

| DP# | DP | Action |
|---|---|---|
| Openness | | |
| DP1 | To address the values of openness and security in the design of social VR applications with respect to the interaction between customers and customer service representatives, features should be built in that allow customers to have their individual characteristics (e.g., gender, voice) unidentified in order to anonymize their identity (based on Blackwell et al., 2019b; Freeman et al., 2022). | REV |
| DP2 | To address the value of openness in the design of social VR applications in terms of interaction between customers and customer service representatives, customizable avatar designs should be enabled because this allows customers to freely set their appearance (based on Freeman et al., 2022; Waltemate et al., 2018). | AD |
| DP3 | To address the values of openness and safety in the design of social VR applications regarding the interaction between customers and customer service representatives, age-dependent spaces (e.g., above 18 years) should be implemented because this can counteract harassment (based on Blackwell et al., 2019b; Lorenz et al., 2023; Valori et al., 2020). | NE |
| DP4 | To address the values of openness and safety in the design of social VR applications regarding the interaction between customers and customer service representatives, a third-party mute function should be implemented because it can stop verbal harassment (based on Freeman et al., 2022; Sabri et al., 2023). | AD |
| Security | | |
| DP5 | To address the value of security in the design of social VR platforms in terms of interaction between customers and customer service representatives, an optional user authentication system (2FA and optional authentication via eye movements or fingerprints or other biometric data) should be implemented because this protects against unauthorized access by third parties (based on Lin & Latoschik, 2022; Wang et al., 2023). | REV |
| DP6 | To address the value of security in the design of social VR applications in terms of customers' interaction with customer service representatives, sensitive customer data should be encrypted in the applications because this reduces the risk of unauthorized access by third parties (based on Kulal et al., 2022; Sun et al., 2022; Wang et al., 2023). | AD |
| DP7 | To address the value of security in the design of social VR applications regarding the interaction between customers and customer service representatives, the information flows between social VR applications and third-party providers and the general data processing should be transparently disclosed, to allow customers to know what information is processed and how it is stored (based on Kulal et al., 2022; Sun et al., 2022; Wang et al., 2023). | REV |
| DP8 | To address the value of security in the design of social VR apps in terms of customer and customer service representative interaction, operators and customer service representatives of social VR apps should release patches and security updates through training to draw attention to current security risks, as this helps to continuously maintain platform security for customers (based on Nath, 2022; O'Brolcháin et al., 2016; Wang et al., 2023). | AD |
| Liability | | |
| DP9 | To address the value of liability in the design of social VR applications in terms of customer and customer service representative interaction, systems (e.g., AI) should be integrated that detect erroneous behavior so that it can be relayed to parties who will assess the detection (based on Luong et al., 2023; Tanaka et al., 2023). | REV |
| DP10 | To address the value of liability in the design of social VR applications in terms of interaction between customers and customer service representatives, moderators, juries, and formal debates (a prerequisite for joining these e.g., a good score from DP3) should be integrated, which judge e.g., messages from users and the system from DP9, because this could contribute to effective law enforcement in the virtual space (based on Kulal et al., 2022; Veeraiah et al., 2022; Wang et al., 2023). | REV |

Comparable to the criteria of Evaluation Cycle 1, Table 6 summarizes the results of Evaluation Cycle 2.

## 6. Discussion

### 6.1. Main findings and implications of research

In the following, the results of the revised or newly added DPs are discussed and main findings and research implications are derived.

In contrast to previous studies (e.g., Blackwell et al., 2019b), our results show that DP1 scored relatively negatively (ME $< 4$) in all the categories of UN, RE, US, and EF. This is due to study participants arguing that when a customer reports a problem to customer service, the goal is usually to be assisted effectively and without much effort. Here, anonymizing the customer's identity (e.g., gender, voice) can be a hindrance in the resolution process, as the customer service representative may lack access to the customer-related data.

DP2 was rated as average (UN $> 4$, rest $< 4$). Accordingly, the results also show limited agreement with previous studies (e.g., Freeman et al., 2022). Similar to the study by Freeman et al. (2022), our results show that customizable avatar designs in social VR can contribute to faster identifiability which has the effect of decreasing harassment levels. In contrast, our study participants indicated that customizable avatar designs can be useful to increase openness. In addition, from a customer perspective, a custom-designed avatar can lead to a closer connection with social VR platform, which in turn can contribute to longer usage time.

DP3 also rated as average (UN, RE $> 4$ and US, EF $< 4$). The participants in the study stated that it is understandable and relevant to pay attention to the protection of minors and to create age-appropriate spaces (e.g., above 18 years) for interaction between customers and customer service representatives. Consistent with previous studies (e.g., Blackwell et al., 2019b), this provides evidence that customer harassment can be minimized. What was expressed as negative in terms of effectiveness by the participants is that the age of customers could be falsified.

DP4 rated positively in the UN, RE, and US categories (ME $> 4$), but has a low EF (ME $= 3.97$). Consistent with past studies (e.g., Blackwell et al., 2019a, 2019b), our results show that this feature may be very important to preventing

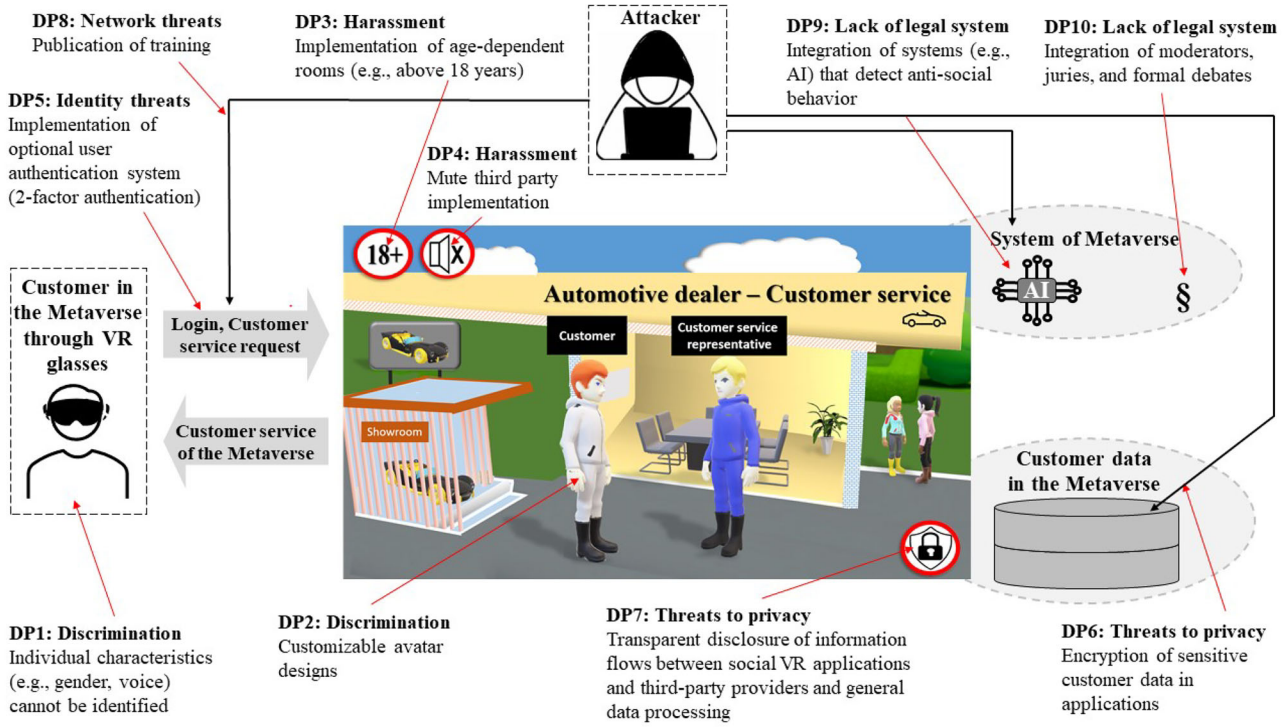


Figure 7. Instantiation of DPs.

harassment. In addition, we suggest that during the interaction between customers and customer service representatives, customer service representatives should pay attention to preventing offensive remarks by preventing offensive remarks made by third parties using this feature.

DP5 is rated positively in all categories (ME $>$ 4). Consistent with previous studies (e.g., Nath, 2022), our results show the importance of DPs. Here, we suggest that a user authentication system (e.g., 2FA, biometrics) can provide a sense of security to customers.

DP6 was rated very positively in all categories (ME $>$ 4). Previous studies (e.g., Maloney et al., 2020c) indicate the importance of protecting data (of customers), and we also support this with our results. Accordingly, we suggest that encrypting sensitive customer data in social VR apps regarding customer and customer service representative interaction is an essential aspect to increasing data privacy and customer trust.

DP7 was rated as average (UN, RE $>$ 4, rest $<$ 4). This is due to the fact that the participants in the study emphasize how important transparency is for customer trust and that customers should know what happens with their personal data. Hence, consistent with previous studies (e.g., Wang et al., 2023), this DP can help increase the customer's sense of security.

DP8 is positively scored in the UN, RE, and US categories ($ME > 4$), but has a somewhat low EF ($ME = 3.98$). This is due to the fact that the training of operators and/or customer service representatives should always be updated to the state of the art. This disclosure towards the customer can lead to an increase in the customer's trust and at the same time contribute to increased customer safety. Thus, we show agreement with previous studies (e.g., Wang et al., 2023).

Likewise, DP9 was rated negatively in all categories ($ME < 4$). This is due to the fact that almost all participants stated that these systems (e.g., AI) would have to function error-free, and that it may be difficult for an AI to understand sarcasm, which could result in incorrect decisions. Thus, consistent with previous studies (e.g., Kenwright, 2018), we argue that standards need to be created for this DP, and that this type of judgment is not to be made exclusively by an AI.

DP10 was also rated negatively in all categories ($ME < 4$). The study participants emphasize that this DP could be very complex and cost-intensive, since the employee costs could be higher than the costs for a system. Similar to past studies (e.g., Wang et al., 2023), this suggests that norms regarding law enforcement in social VR should be created to clearly regulate whether and what personal customer data is viewable by third parties.

### 6.2. Main findings and implications for practice

In terms of practice, the findings offer design recommendations that developers can implement so that applications are developed in a value-sensitive manner within the context of customer service. The knowledge gained can be applied to the metaverse so that it reduces problems in the various values of openness, security, and liability in the future. In general, the findings provide a basic building block that can be used to establish industry-wide ethics standards (e.g., for the automotive industry).

The main findings (MF), implications (I), and recommended actions for practice are listed below.

RQ: Which design principles with respect to openness, security, and liability for social VR applications regarding

**Table 5.** Multi group analysis for the countries of origin of the evaluation cycles.

| Relationship \ Condition | Difference | *p*-Value | Confidence intervals (bias-corrected 95%) | Result |
|---|---|---|---|---|
| Comparison: Countries of origin (EC 1) vs. Countries of origin (EC 2) | | | | |
| Liability → Openness | 0.164** | 0.058** | [0.442*; 0.258*] | Not significant |
| Liability → Security | −0.032** | 0.660** | [0.501*; 0.506*] | Not significant |
| Security → Openness | 0.012* | 0.445* | [0.504*; 0.460*] | Not significant |

EC: evaluation cycle; *$p$-value $< 0.05$; **$p$-value $< 0.01$.

**Table 6.** Results evaluation cycle 2.

| | Understandable | | Relevance | | Usefulness | | Effectiveness | |
|---|---|---|---|---|---|---|---|---|
| DP# | ME | SD | ME | SD | ME | SD | ME | SD |
| DP1 | 3.89 | 0.96 | 3.65 | 0.98 | 3.51 | 1.02 | 3.53 | 1.03 |
| DP2 | 4.03 | 0.99 | 3.58 | 1.16 | 3.58 | 1.11 | 3.56 | 1.12 |
| DP3 | 4.22 | 1.04 | 4.06 | 1.14 | 3.99 | 1.17 | 3.63 | 1.19 |
| DP4 | 4.27 | 0.93 | 4.03 | 1.06 | 4.12 | 1.20 | 3.97 | 1.10 |
| DP5 | 4.37 | 1.02 | 4.27 | 1.10 | 4.34 | 1.24 | 4.25 | 1.19 |
| DP6 | 4.46 | 0.99 | 4.43 | 1.14 | 4.38 | 1.23 | 4.30 | 1.14 |
| DP7 | 4.19 | 1.01 | 4.07 | 1.06 | 3.90 | 1.14 | 3.83 | 1.15 |
| DP8 | 4.23 | 0.93 | 4.13 | 1.06 | 4.06 | 1.13 | 3.98 | 1.09 |
| DP9 | 3.92 | 0.94 | 3.80 | 0.97 | 3.79 | 1.02 | 3.60 | 1.05 |
| DP10 | 3.46 | 1.26 | 3.39 | 1.15 | 3.34 | 1.16 | 3.20 | 1.19 |

the interaction between customers and customer service representatives can enable value-sensitive use?

One main finding is that our research results corroborate previous studies (e.g., Freeman et al., 2022) and thus can contribute to reducing the problem area of discrimination within the value openness in the design of social VR applications regarding the interaction between customers and customer service representatives in the future (*MF1*). Therefore, we suggest that companies should enable gender-neutral avatars for customers or customer service representatives (*I1.1 Enable gender neutral avatars*). In addition, we recommend that companies should be able to identify the perpetrator without much effort in the case of punishable acts involving interactions between customers and customer service representatives (*I1.2 Detect offenders without much effort*).

Another main finding can also be shown in the context of the value of openness and concerns the problem area of harassment. Similar to previous work (e.g., Blackwell et al., 2019b), our results show that our study can help counteract harassment in the design of social VR applications with respect to the interaction between customers and customer service representatives (*MF2*). Therefore, we suggest that companies place value on implementing a block system in addition to the third-party mute feature. This block system could be used to identify and block certain users who are muted excessively (*I2.1 Implement block system*). Furthermore, we suggest that companies should make it a point to implement a blocking function that prevents the creation of a new account if a third party has been muted regarding the interaction between the customer and the customer service representative in social VR (*I2.2 Implement a blocking function*).

Another main finding emerges regarding the value of openness for the design of social VR applications in relation to the interaction between customers and customer service representatives (*MF3*). For this, we suggest that companies should place value on creating a good mood for customers in the context of customer service, e.g., during waiting times, by integrating soothing music (*I3.1 Integrate soothing waiting time music*). In addition, we recommend that companies make a point of ensuring that the language used by customer service representatives in their interactions with customers in social VR does not come across as artificial (*I3.2 No artificial language used by customer service representatives*). Furthermore, we suggest that companies make sure that accessibility is taken into account in the interaction between customers and customer service representatives in social VR (*I3.3 Consider of accessibility*).

Significant insights are also revealed by our research results in the problem area of identity related threats, in the context of the value of security in the design of social VR applications regarding the interaction between customers and customer service representatives. Here, in line with previous studies (e.g., Nath, 2022), the results may help counter this problem area in the future (*MF4*). Therefore, we recommend that companies emphasize performing regular security checks on systems to prevent security breaches (e.g., in 2FA) (*I4.1 Perform regular security checks on systems*). We also suggest that companies make a point of setting up a blocking hotline to protect customer data in the event of identity theft (*I4.2 Implement blocking hotline*).

Another main finding is related to the value of security. Here, our results can lead to reducing privacy threats regarding the interaction between customers and customer service representatives in social VR (*MF5*). Here, we recommend that companies emphasize that the selection of settings, and what customer information is processed and stored, is user-friendly (*I5 User-friendly setting options*).

Moreover, a main insight can be shown in the problem area of network threats in the context of the value of security in order to counteract these threats in the future (*MF6*). In this context, we recommend that companies attach importance to training operators and customer service representatives and that this training is carried out by qualified personnel (*I6 Qualified personnel training*).

Our results reveal a main finding in the problem area of the missing legal system in the context of value liability in the design of social VR applications regarding the interaction between customers and customer service representatives. With this, we argue that the results can contribute to creating a missing legal system (*MF7*). Thus, we suggest that companies should emphasize implementing a "report user" button to cover gaps in AI (*I7.1 Implement report user button*). Also, we suggest that the state should work with companies to establish clear disclaimers and terms of use that define the legal obligations of the social VR platform and its users (e.g., customers) (*I7.2 Establish disclaimers and terms of use*).

## 7. Conclusion

### 7.1. Main aspects of this research study

Previously, there were no research contributions that considered design-oriented values of openness, security, and liability on social VR applications with respect to the interaction between customers and customer service representatives. Therefore, this paper presented DPs that consider this perspective. In summary, social VR applications currently have a large number of problem areas. It is important that these are combated in the metaverse and in social VR applications in the future so that they enable value-sensitive use in the context of customer service. A main finding of our research paper confirms that our results can support the reduction of discrimination in social VR applications within the interaction between customers and customer service representatives, e.g., by designing gender neutral avatars.

### 7.2. Limitations

Despite this insight, this paper is subject to several limitations. The results developed in this paper are based on ethical values of openness, security, and liability. Here, it can be noted that ethical values of openness, security, and liability change depending on subjective perception. Additionally, there are limitations regarding the methodological approach. There may have been bias in the literature search due to the use of a scraper that may have missed some relevant sources. Thus, there is a possibility that further problem areas were not identified. In addition, this is a fast-moving topic, so new articles can quickly lose relevance.

### 7.3. Outlook

Future research studies can benefit from these findings as they show new research areas that have not been investigated before. As an example, it is necessary that the health risks (such as talk time (play time)), which can be caused by social VR, should be researched. Also, the defined DPs can be implemented in practice so that they are evaluated with studies during real-world use. Thus, it can be investigated how users perceive these DPs during use, what real benefits they have, and whether value-sensitive design can be enabled with the DPs.

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No potential conflict of interest was reported by the author(s).

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## Appendix

**Table A1.** Category system according to Mayring (2015).

| Dimension | Definition | Anchor examples | Coding rules |
|---|---|---|---|
| Openness | In the context of social VR, openness should be related to how open-minded and tolerant users are towards each other.<br>Problem identification in the area of openness:<br>• Discrimination.<br>• Harassment | "Harassment is very visible to users (customer) in social virtual reality. Two out of seven women and 21 out of 99 men reported experiencing harassment, and 42% of users said they witnessed someone else being harassed." (Shriram & Schwartz, 2017, p. 2) Discriminatory remarks and scathing words by male users toward female users (customers in customer service) can potentially give the impression of their superiority (Paul et al., 2019). | If an issue involves the areas of "*discrimination*" or "*harassment*," it falls into the area of openness. |
| Liability | The liability dimension describes the responsibility for the harm of another who comes to harm in social VR.<br>To cover the liability dimension, responsible persons should think about the following points:<br>• Proceeding when a person is harmed<br>• Creation of personal responsibility<br>• Establishing corporate governance | "The flat-based design of several DAOs can hinder the members' involvement in the decision-making process as the number of voting sessions can become cumbersome." (Fernandez & Hui, 2022, p. 3) Virtual contracts concluded in a metaverse (e.g., between a customer and a customer service representative) may violate legal regulations or laws (Gadekallu et al., 2022). | If an issue falls into one of the areas of "*how to proceed if a person is harmed*," "*creating ownership*," or "*establishing corporate governance*," it belongs in the liability area. |
| Security | Security can be defined as being protected from danger or harm.<br>In the context of social VR, these areas should be protected, including:<br>• Identity<br>• Personal data/ customer data | It is possible that attackers can obtain customer data and identities in the metaverse by exploiting security vulnerabilities via AR and VR systems (Nath, 2022, p. 10). | If an issue describes a breach of one of the defined areas "*identity*," or "*personal data*," it belongs to the Security category. |