Social VR as the New Normal?

Understanding User Interactions for the Business Arena

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Due to the COVID-19 pandemic, online meetings have become the new normal amongst business professionals. The usage of video conferencing services such as Zoom has skyrocketed, and the usage of Social Virtual Reality (VR) services have also been taken under consideration to be the new normal as it enables users to have a spatial online presence; nonetheless, the usage of Social VR has been considerably lower compared to video conferencing services. The purpose of this study is to investigate the user interactions of business professionals regarding the web-based Social VR platform, Mozilla Hubs, and suggest alterations regarding the user experience in order to understand why the usage of Social VR is low amongst business professionals and to promote the usage of the platform that could resolve the issue having a lack of spatial presence in the online arena.

CCS CONCEPTS • Human-centered computing~Human computer interaction (HCI) • Human-centered computing~Interaction design~Empirical studies in interaction design • Social and professional topics~User characteristics~cultural characteristics

Additional Keywords and Phrases: Virtual Reality, Mozilla Hubs, Business Meetings, Online Meetings.

1. INTRODUCTION

Social Virtual Reality (VR) enables users to interact with one another in a VR space with or without the need of Head-Mounted Displays (HMDs). There is a diversity of Social VR platforms available, and such platforms vary when it comes to software and hardware requirements, aesthetics, purpose, theme, functionality, and features. Prominent Social VR platforms include Facebook Spaces, VR Chat, High Fidelity VR, and Mozilla Hubs. In this research, we focus on the perception of business professionals regarding Mozilla Hubs. Mozilla Hubs was chosen because the platform is the most accessible and flexible amongst the platforms available in the sense that the platform does not require a HMD or the installation of additional software in order to access the platform. Mozilla Hubs is accessible via the web, and users can be invited onto the platform via a link like widely used online conferencing tools such as Zoom. We aim to analyze the perception of business professionals regarding the platform as unexpected pandemics such as COVID-19 has fostered the growing demand regarding online meetings. Deeper understanding on how business professionals interact with the platform could serve as a guideline for developers and designers to further improve Social VR; this could serve as an alternative for business professionals to resort to when they need a more spatial presence online compared to the widely used online video conferencing software such as Zoom, Skype, and Google Hangouts.

2. LITERATURE REVIEW

Existing research on online meetings largely focus on exploring and improving the technological aspects of online meetings, and dissecting what online meeting platforms are preferable amongst individuals. A study done on improving online meetings focused on automating the visualization of the history of virtual meeting rooms (Boellstorff, 2010) while research on user perception of online meeting platforms mainly concentrated on exploring the usage of conventional online meeting functions such as instant messaging (McVeigh et al., 2018).

Like conventional 2-dimensional social media platforms, the different aspects amongst the Social VR platforms contribute to the difference in the behaviors that users show; for example, because the main purpose of Facebook Spaces and Mozilla Hubs is communication, people tend to talk to each other in the room while users of Rec Room and AltspaceVR focus more on playing structured activities such as games or creating landscapes (Kerr, 2008). It is interesting to note that users who see guns and knives as available objects within the Social VR space were more prone to harass other users while items such as basketballs and dodge balls were seen as positive social lubricants to start a game with other users (Kerr, 2008). In other words, the spatial presence and the capability of embodied interaction with a virtual object affected users to emotionally engage more with the interaction that they were partaking in online. Incidents of online harassment is higher in Social VR platforms compared to conventional 2-dimensional social media platforms due to this online spatial presence that further emotionally engages the user (Ginsberg, Allen, and Ahuja, 1995; Kim et al., 2012). The visual form of the avatar that the user assumes upon factors into the difference in behavior that the users show; for example, a male user is prone to act differently when he assumes upon the embodied presence of a female in Social VR (Ginsberg, Allen, and Ahuja, 1995). It can be deduced that the environment, functions, and objects within Social VR platforms would greatly shape the behaviors of users within the platform; thus, it can be further inferred that objects or an environment that emulate an ambience apt for a business meeting would render users to further engage in the business meeting due to the increased emotional engagement with the space due to the embodied spatial presence available to the users.

Despite the variety of existing research on Social VR, there is a lack of research on user perception of Social VR as a medium for online meetings in the business arena. With the increasing need of non face-to-face meetings in the business context due to the COVID-19 pandemic, it is integral to understand the user perceptions of business professionals regarding Social VR in order to discern what technology would be the best to be incorporated into Social VR platforms so that it could be used in a more widespread manner in the business context.

3. METHODS

A survey and 3 focus group interviews were conducted from April to May, 2020 in order to collect data on user perceptions on Social VR and online meetings in the context of business. First, a survey via Google forms was conducted on 326 workers in the Republic of Korea, the United States, and the United Kingdom to learn more about their experiences and perceptions of using online meeting services including Social VR. Next, 3 focus group interviews were conducted to collect further data.

There were a total of 9 participants recruited to participate in a focus group interview. The participants were comprised of 5 males and 4 females with the age ranging from those in their 20s to those in their 40s. Amongst the 9 participants, 7 participants were situated in South Korea, 1 participant from was in Hungary, and 1 participant was in Mexico; the participants from Hungary and Mexico were interviewed online, and the participants were divided into 3 groups. The first

group was comprised of participants of different positions, different industries, and different locations in order to learn whether Social VR is suitable for online meetings that take place cross-industry and cross-border. The second group is comprised of junior working professionals who work within the same team of the same company, in this case, finance to learn whether Social VR is apt for team meetings. The third group consisted of senior working professionals of the same company in order to understand the user perception of those in senior status within the company.

The focus group interviews were conducted for duration of 60 minutes. During the first 40 minutes, users were asked to conduct tasks that involved the main functionalities of the platform, and then asked to conduct tasks that would require them to interact with other interview participants. After this procedure, an interview asking about their experience of using the platform compared to the online meeting services that they use for work were conducted to learn more about their experience and perception regarding Social VR in comparison to popularly used online meeting services.

4. FINDINGS

This section unpacks the findings of the survey results and interviews that were conducted on user perception in the business arena. The following are the findings of the preliminary survey conducted on business professionals.

4.1. Survey Results

48.2% of the participants replied that they used online meeting services more than 1 time a week during the past 2 months while 39.3% of the participants replied that they barely used online meeting services during the past 2 months.

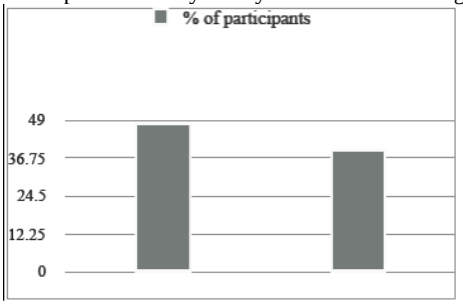

Figure 2: (Left) participants who replied that they used online meeting services more than 1 time a week; (Right) participants who replied that they barely used online meeting services Multi-part figure.

63.5% of the participants replied that they prefer offline meetings while 27% of the participants replied that they prefer online face-to-face meetings. Only 3.4% of the participants replied that they prefer online meetings that are not face-to-face. Participants liked meetings in the following order: Offline meetings > Online meetings > Conference calls

The most frequently used conference call service was Skype (51.2%). The most frequently used online video conferencing service was Zoom (69.9%). The most preferred online video conferencing service was Zoom (51.8%), and then Skype (32.2%). 88.9% of the participants did not hear about Social VR before. 64.7% of the participants replied that they would be willing to use Social VR for business meetings.

4.2. Interview Results

4.2.1. High learning curve due to unfamiliar interface that is different from popular video conferencing services

The focus group interview revealed that the learning curve for Social VR is relatively high compared to online meeting services such as Zoom or Skype as Social VR has more features compared to Zoom and Skype. Participants (P1, P3, P7), which were iPhone users, stated that because iPhones support face-to-face video calling, they had an easier time adjusting to Zoom or Skype for business meeting purposes; however, all the users had a hard time navigating through Social VR as all of them had no previous experience in using VR as VR usage is not widespread in the status quo. P1 stated that he had a hard time perceiving the purposes of the functions given because of the interface of Mozilla Hubs was unfamiliar to him: “Most of the inconveniences in applications like Skype and Cisco WebEx has been fixed because they were in the industry for a long time. But since a lot of people aren’t used to VR since it’s barely used in the business context compared to Skype or Cisco WebEx, it was hard to know what is what within the platform. It was especially hard for me since I never used VR before.” (P1)

4.2.2. Confused cognition due to the lack of obvious user activity indicators

There were three types of cognition-related issues that were perceived. Firstly, participants (P3, P4, P5, P6) stated that it was hard to know which user entered, left, or was talking as there was merely a pop-up in the chatting room function of Mozilla Hubs to briefly notify the participants that a user entered or left. They also voiced that it was hard to know who was talking as the only indicator that a user is talking is the head of the avatar moving. P5 noted that there should be a more intuitive and obvious indicator to notify the users of who entered, left, and who is talking in order to make the platform a more suitable place for online business meetings: “When there are only a couple of people in the room it’s possible to know who entered and who left, but when there is more than 3 or more participants in the room, it’s unclear whether who entered or left the room because there aren't any obvious indicators regarding this.” (P5)

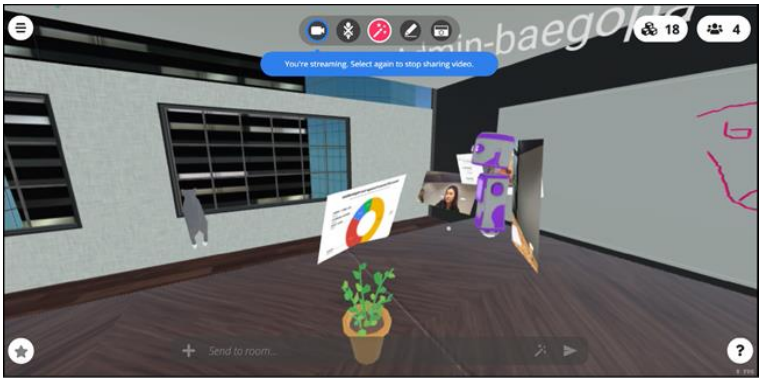

Figure 3: Participants confused of multi-user interaction in Mozilla Hubs

P3 stated that it would be great if the scene that the user is viewing changed naturally. P3 also mentioned that if someone is talking, the participant wishes that the scene would transition to the person who is talking like how a person would naturally face a person who starts talking in an offline business meeting. P3 said the same applies to activities such as drawing, or sharing a photo/video as the sight of the participants of a business meeting naturally focus on the person who does such activities during a business meeting: “In an actual meeting, people subconsciously look at the direction where

the sound comes from. However, the in the VR environment, it's hard to know who's speaking because the sound comes from the speaker." (P3)

Secondly, discomfort regarding the navigation of the platform was also noted. P5 stated that miscellaneous 3-dimensional items are needless in Social VR for business purposes as even offline business meetings do not require such items: "I personally do not think people need that much freedom or functions while conducting an online meeting. If the purpose of the VR environment is to create a 'virtually real' environment, even in an actual offline meeting we do not usually need a plant vase or fish tank as a prop in the room." (P5)

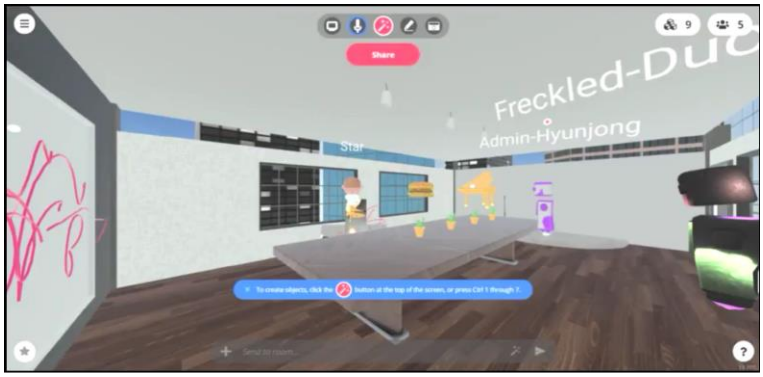

Figure 4: Participants expressing discomfort regarding unnecessary excess functions

Lastly, participants (P3, P4, P6, P8) stated that a presentation file or a whiteboard is the center of focus during a business meeting, and said that the platform granted too much freedom on the user end as there was no focal point to focus on such as a whiteboard or a specific place dedicated for sharing a presentation. They (P3, P4, P6, P8) also stated that it would be better to have designated seats for users so that they would know where to stay as most business meetings are conducted in a seated setting. "It would be better if there was a place for a presentation screen and that place was the default place of focus because most business meetings are about looking at the presentation of a presenter. Plus, it's hard to navigate the screen to focus on the screen another person put up because I'm not used to VR navigation." (P3)

4.2.3. Entertaining, yet the cartoon-like feel hinders the professional-feel of the service

Participants (P1, P3, P4, P6) stated that the platform was entertaining because it was refreshing due to the following points: 1) it was liberating to see a spatial virtual background other than the monotonous setting of a conventional video conferencing meeting service like Zoom, 2) it was refreshing to be able to navigate around a virtual space and also draw and add items on the open space, 3) it was entertaining that they can change the scene of the virtual meeting space. P3 addressed that it would be entertaining to have a meeting at a virtual beach instead of Zoom or Skype as they would be able to feel like they are having a meeting at a vacation spot: "This (Mozilla Hubs) is better than Skype or Zoom since I could look out into a holiday venue like the beach during the meeting. Plus, it's more liberating because I can look around unlike Zoom. In Zoom, I have to look at a 2D screen the whole time which is stressful and dull." (P3).

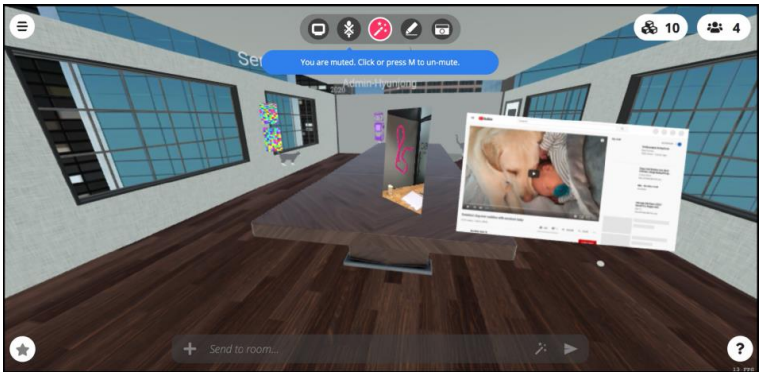

Figure 5: Participants interacting with entertainment elements within Mozilla Hubs

In contrast, participants (P3, P4, P6, P8, P9) expressed that Mozilla Hubs looks unprofessional and cartoon-like. They did not think that the platform would be favored by senior working professionals as they would think that the platform looks too cartoonish. In particular, P8 pointed out that the avatars that resemble a crude robot was the main contributing factor to the cartoon-like feel of the platform: "It would be better if the avatars resembled humans or the user more as it would make the platform for professional and suitable for the business context." (P8)

4.2.4. Confirming visual components required for avatars

The avatars available within Mozilla Hubs do not display arms, legs, or facial expressions. Participants complained about the visual limitations of the avatars as it confused their control of navigation throughout the app; for instance, participants were confused about their direction or place within the app because of the absence of arms or legs, and confused about who was speaking because of the lack of visual indicators incorporated with the avatar that makes such information perceivable. Thus, there should be user research specifically implemented on the necessary visual components to be incorporated within web-based Social VR avatars; factors such as the resolution of the avatar should also be taken under consideration when such research is conducted since an avatar of a high-resolution may be too heavy for a web-based program to handle.

5. IMPLICATIONS & DISCUSSIONS

5.1. Functions necessary for business context usage

The following requirements were extracted as implications to serve as guidelines for a development of a web-based Social VR platform that would be apt for business context usage. The priority scale was decided based on the evaluation of the frequency of the concerns quoted from the focus group interviews on a scale of 1 to 3.

Table 1: Functional requirements for a web-based Social VR platform for business usage

Priority	Functional Requirements
3	Code input entrance for on-boarding (no login required)
2	Presentation screen set as default point of focus

Priority	Functional Requirements
	Designated seats for users
	Automatic transition of eyes to the person who is talking
	Profiles tab to customize avatar
1	Switching outside settings tab (variety of holiday locations)
	Icon to share video screens

Table 2: Non-functional requirements for a web-based Social VR platform for business usage

Priority	Functional Requirements
3	Performance - time required to complete tasks
	Usability - smooth interaction of end user with the product
	Training - level and nature of training to use the product
2	Accuracy - level of precision of actions conducted
	Security - guarantee of the security of user data input
	Scalability - capacity to perform smoothly with more user/data input
1	Look-and-feel - how end-users perceive the product

5.2. Need for key visual indicators to ensure professional feel

The design of the avatar and the Social VR space should bear key visual indicators to ensure that the users perceive Social VR as an apt option to conduct business meetings. In the context of avatars, the users should be able to select basic features such as glasses and hairstyle in order to ensure that users are able to perceive which avatar represents which user. Moreover, there should be the name of the user as well as an icon to note which user is talking, and which user is willing to speak next in order to prevent confusion. A microphone icon could show on top of the avatar of the user that is talking while a hand icon on top of an avatar could represent a user willing to speak next. The resolution or color of the avatar are less important than the indicators that enable users to note who is talking, and who desires to speak next as such features are more important in the business context.

In addition, users should be able to decide their meeting setting based on the purpose of meeting or their preference. There is no need for the Social VR meeting space to exactly resemble that of the user's company as users voiced that

they pay more attention to the speaker and the presentation material of the speaker. However, users should be able to choose the theme of their meeting room that is appropriate to their industry background. For example, finance and legal professionals could choose a meeting room that looks professional while a start-up could choose a room that looks open and casual for their business meetings. Key visual indicators such as a company logo, slogan, or a poster that portrays corporate values could be added onto the walls of the virtual meeting space in cases such as corporate interviews when the users wish to deliver and fortify their brand identity. Such measures would help to promote businesses to actively utilize Social VR and realize the benefits of Social VR.

5.3. Barriers against a smooth navigation

Users had a hard time navigating throughout the app because of the following reasons: 1) it was difficult to perceive where they were at within the platform because the avatar does not have arms or legs, 2) it was hard to know who was talking because the avatars do not resemble the users, 3) it was hard to know what the other user is trying to say because the avatar does not reflect the facial expression of the user, 4) it was hard to see the face of the other user as the video of the user attached to the avatar was not visible on all angles, 5) the placement of icons was not intuitive as it was noted that a drop-down menu would have been more intuitive compared to the current scattered layout of icons, and 6) there were unnecessary excess functions within the app such as the option to place miscellaneous 3-dimensional items like hamburgers or fish tanks which diverted the users from conceiving the space as a place apt for a business meeting.

6. CONCLUSION & FUTURE WORK

This research aimed to diversify the participants of the survey and interviews conducted; nonetheless, it is important to note that the survey was conducted online to communities pertaining to a limited range of industries, regions, and colleges. Thus, there should be more user research conducted on a more diverse demographic in order to understand the user perception in a more comprehensive way.

Moreover, it is imperative for other Social VR platforms to be explored whether they are appropriate for usage in the business context as this research focused on the user perception on Mozilla hubs. Other Social VR platforms such as VRChat has a highly disparate look and feel and different functionalities compared to Mozilla Hubs; for example, VRChat enables the user to customize the specific body parts of their avatar that is capable of ‘walking’ through a virtual space. Nonetheless, VRChat was not selected as a means of user research for this study because the platform only works on a Windows-based Operating System (OS), and because it requires the installation of Steam; thus, this study invites researchers to conduct user research on VRChat as it would be crucial in learning user needs in the context of a high-resolution and highly interactive Social VR platform.

Although there are limitations of the web-based Social VR platform Mozilla Hubs in order for it to serve as an apt place for business meetings, the platform still has a considerable amount of potential for businesses to carry out corporate meetings as it provides the users with a unique spatial presence that is absent in 2-dimensional video conferencing services such as Zoom or Cisco Webex.

The further development of web-based Social VR platforms so that it can be utilized in the business context is necessary as the advent of the global pandemic COVID-19 has facilitated the transition of business meetings to the online context. The option to have a spatial presence, view 3-dimensional objects, and collaborate in a 3-dimensional virtual

environment will enable companies to resolve the limitations that current 2-dimensional video conferencing services have.

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