Social VR as the New Normal?

Understanding User Interactions for the Business Arena

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Abstract

Background

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.

Methods

A survey on 326 business professionals residing in the Republic of Korea and 3 focus group interviews on a total of 9 business professionals of diverse backgrounds and industries were conducted from April to May, 2020 in order to collect data on user perceptions on Social VR and online meet-

ings in the business context.

Results

Users preferred offline meetings over online meetings, and online meetings over conference calls when it came to the perception on conventional online meeting services with Skype and Zoom being the most popular platforms used for online meetings. Although 88.9% of the participants did not hear about Social VR before, 64.7% of them were willing to use Social VR for business meetings. Regarding the user experience of Mozilla Hubs, we found that there is a high learning curve because the user interface is highly different from popular video conferencing services, and there was also confused cognition due to the lack of obvious user activity indicators within the platform; moreover, although the platform is entertaining, participants were concerned about the cartoon-like feel of the platform that rendered the service seem less professional.

Conclusion

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

Keywords

Virtual Reality, Mozilla Hubs, Business Meetings, Online Meetings.

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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. Despite the variety of Social VR platforms available, this research focuses on the perception of business professionals regarding Mozilla Hubs. Mozilla Hubs was chosen based on the fact that 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. This research aims 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 research 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 Social VR can largely be categorized into three types. First, there is research on the technological aspects that could be utilized in Social VR. The effectiveness of incorporating technology such as electromyography (Schild et al., 2018; Schubert et al., 1999), bioacoustics (Doyle and Denise, 2010; Iravantchi et al., 2019), electrical impedance tomography (Sra et al., 2018; Thompson, 2018), contour and pressure sensing (Boellstorff, 2015), worn computer systems (Fourie, 2009), and a sensing technique that utilizes acoustic interferometry (Zhang et al., 2016) for onbody gesture recognition to improve the overall Social VR user experience was explored. Second, there are studies on user perceptions of Social VR in various experimental real-world contexts. Medical training (Pongolini et al., 2011), collaborating learning (Sra et al., 2018), and dancing (Saponas et al., 2009) are some contexts where the application of Social VR was explored (Kerr, 2008). Third type is research on Social VR gaming platforms. Ethnographic research

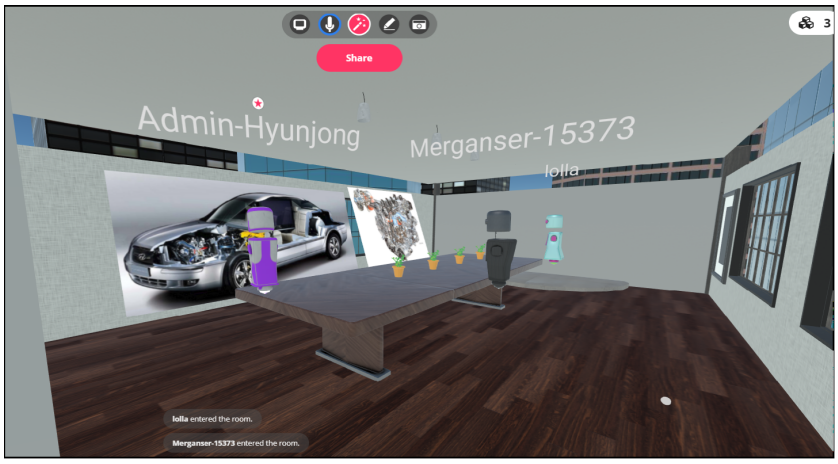
(Castronova, 2008a, Castronova, 2008b; McVeigh et al., 2019; Pearce, 2011; Snodgrass, 2013) and research on the social activities (Dementyev et al., 2014; Dibbell, 1998; Ginsberg et al., 1995; Harrison et al., 2010; Laput et al., 2016; Ondrejka, 2004; Pallay et al., 2009; Saponas et al., 2008) that the gamers of Social VR games enact reveal how gamers act differently when they have a spatial presence in a virtual world (Kim et al., 2012).

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).

There are a variety of Social VR platforms and the interaction dynamics and the interface of these platforms vary. 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 was interesting to note that users that 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. It is interesting to note that 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 creation of an avatar that the user can physically control factors into the difference in behavior that the users show; for example, a male user can assume the embodied presence of a female in Social VR via the creation of a female avatar (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.

The limitation of existing research is that there is a scarcity 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 technologies 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. Please see Fig. 1 to view a small business meeting held in Mozilla Hubs.



〈Figure 1〉 Mozilla Hubs business meeting sample image

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.

3.1. Online meeting services survey conducted on business professionals

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.

3.2. Recruiting participants for in-depth focus group interviews

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.

3.3. Procedures of focus group interview on Mozilla Hubs (Social VR)

The focus group interviews were conducted for a 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.

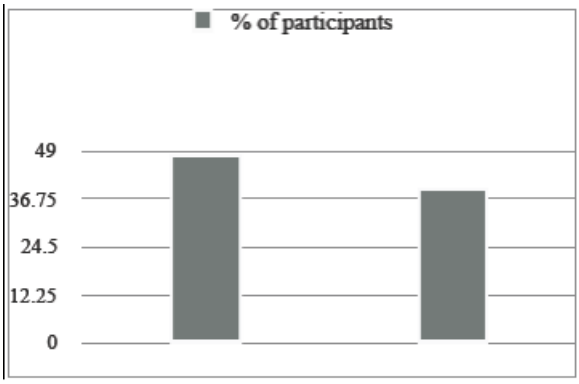
4. Findings

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

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) stated that because popular mobile devices such as iPhones support face-to-face video calling, they had an easier time adjusting to Zoom or Skype for business meeting purposes whereas most of them had a hard time navigating through Social VR as VR is not used 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)

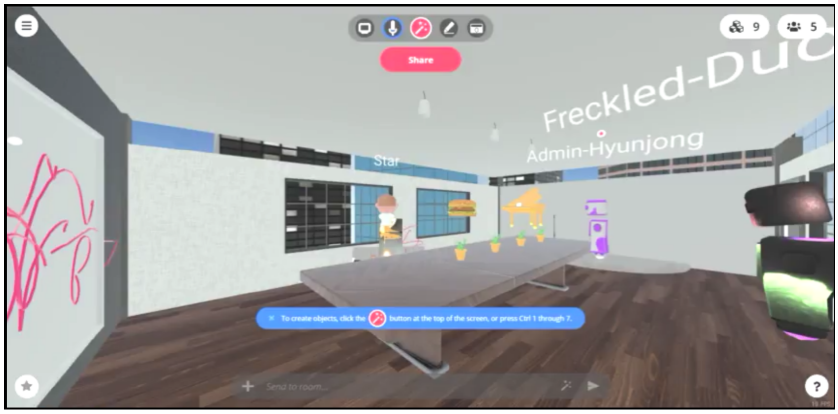
4.2.2. Confused cognition due to the lack of obvious user activity indicators

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, and because 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 stated 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)

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 an inedible hamburger or fish tank as a prop in the room." (P5)



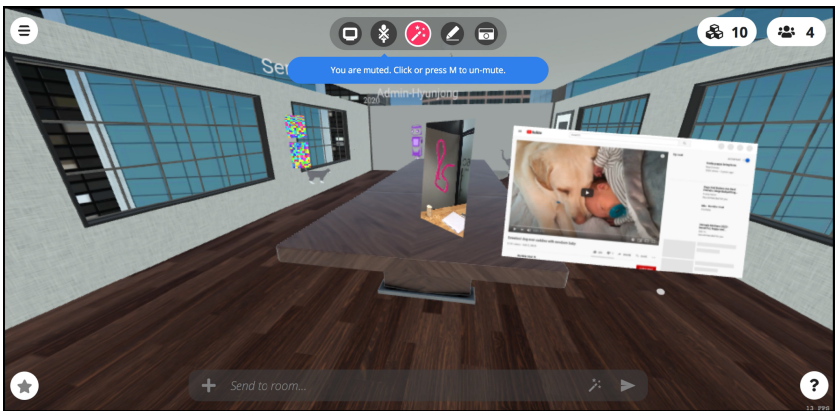
〈Figure 4〉 Participants expressing discomfort regarding unnecessary excess functions

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 also stated that it would be better if there are 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 is entertaining that they can change the scene of the virtual meeting space. P3 stated 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

Participants (P3, P4, P6, P8, P9) expressed that Mozilla Hubs looks unprofessional and cartoon-like. P8 expressed that they did not think that the platform would be favored by senior working professionals as they would think that the platform looks too cartoonish. P8 especially 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)

5. Implications & Discussions

5.1. Functions necessary for business context usage

There should be research done on the amount and content of functions to be placed within a Social VR platform appropriate for business context usage since a Social VR platform apt for such context would require different functions compared to the multipurpose Mozilla Hubs; for example,

functions related to presentation sharing should be highlighted while the on-boarding process of a Social VR business meeting should be simplified to cater to the prompt acceptance of meeting participants from a wide range of contexts.

The extent of the movements that should be capable of web-based Social VR avatars should be explored as well since some participants expressed that they did not feel that moving around is necessary if the Social VR platform was dedicated for business meeting purposes since most participants sit down during a business meeting except for the host in some cases.

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 con text 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
	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	Non-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. 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.

5.3. Barriers against a smooth navigation

Users had a hard time navigating throughout the app because of the fol-

lowing 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

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.

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. VRChat has more interactive elements than Mozilla Hubs and is high-resolution. VRChat was not se-

lected as a means of user research for this study because the platform only works on a Windowsbased. 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.

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. Pertinent research could serve as a guideline for developers and designers to take as reference for Social VR platforms to be used more widespread; an increased usage of web-based Social VR could be conducive economically and environmentally as it could save the transportation fees and other costs that are tied to the preparation of material necessary for off-line meetings that were conducted because of the benefit of having a spatial presence.

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