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## **'We're all in this toGather' – A Virtual World for Improving Knowledge Exchange and Social Interaction for Digital Work**

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# **‘WE’RE ALL IN THIS TOGATHER’ – A VIRTUAL WORLD FOR IMPROVING KNOWLEDGE EXCHANGE AND SOCIAL INTERACTION FOR DIGITAL WORK**

*Research in Progress*

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## **Abstract**

*One drastic change that has been established in many organizations is the possibility of location-independent work. However, working remotely also creates distinct challenges that organizations must face. Thus, remote work could lead to a decrease in social interactions and therefore less implicit knowledge exchange in teams. However, informal conversations are crucial for building and maintaining team cohesion as well as experience transfer among employees. To address this problem, we apply a design science research approach to examine how a virtual world as a work environment could help to overcome those challenges within our research group. We designed a prototype of a virtual world that is based on knowledge gained from three design thinking workshops and tested it over four weeks in a real-world work case. Furthermore, we conducted 16 interviews with employees and present our initial findings of the effects on group awareness, social identity, IT identity, trust, and acceptance.*

*Keywords: Virtual Collaboration, Digital Work, Design Science Research, Knowledge Exchange.*

## **1 Introduction**

The digitization of the workplace continuously changes the way we work and socialize at the job (Brachten et al., 2020; Mirbabaie, Stieglitz, et al., 2021; A. Richter et al., 2018). This process is catalyzed by the omnipresent COVID-19 pandemic (Orlikowski & Scott, 2021). Thus, new possibilities are established to work location-independently, even beyond the pandemic (Wang et al., 2020). Employees have now the choice to determine from where they work such as from home (Ackerman et al., 2021), at coworking spaces (Hofeditz et al., 2020), or even at any place in the world (Frick & Marx, 2021; S. Richter & Richter, 2020). This becomes particularly important regarding the current debate on virtual worlds such as the so-called *metaverse*. While boundaries between physical and digital spaces are blurring, financial experts estimate an \$800 billion market by 2024 (ter Weijde, 2022). In this context, organization may use virtual worlds for recruiting purposes, reaching employees and customers, or intra-firm communication (Goel et al., 2011). Considering new possibilities of working from home and the fast-growing market of virtual worlds, organizations face a need for employees and customers to provide digital work solutions that must be fulfilled sustainably not to be overtaken by competitors.

Regarding the spatial separation of workforces, new challenges for digital work arise such as maintaining social interactions among the distributed employees. Furthermore, boundaries of private and business life might blur due to working from a private place. However, location-independent work

as a new form of work provides employees a lot of freedom in scheduling their work, personal decision making, and establishing a positive work-life balance (Wang et al., 2020). In contrast, informal conversations that people normally have during coffee or mobile breaks are made more difficult (Schlagwein, 2018). However, such informal social interactions are crucial for building work-based relationships and for shaping and identifying with the culture of the organization (Prester et al., 2019). Such informal conversations produce unstructured and implicit knowledge by responding to a variety of questions and answers on a daily basis (Liu et al., 2020).

In contrast to explicit knowledge, implicit knowledge is more difficult to search or share with others as it is built upon knowledge such as experiences or practical skills (Park & Gabbard, 2018; Woods & Cortada, 2000). This emphasized the importance of implicit knowledge exchange at the workplace to support the transfer of certain skills and experiences among employees. However, the establishment of remote work may counteract those informal social interactions and therefore implicit knowledge exchange. To solve this arising problem, we aim to evaluate the potential of virtual work environments for breaking down barriers of social interaction and implicit knowledge exchange. Virtual worlds are multimodal, graphical communication platforms (Schultze, 2010) where users can meet and interact via avatars (Franceschi et al., 2014). Leveraging virtual worlds will allow digital teams to maintain social interactions in distributed work environments, and thus, facilitate implicit knowledge exchange (Kohler et al., 2011). Virtual worlds such as second life have been proven to be able to serve as effective channels for organizations to facilitate collaboration, knowledge sharing and knowledge management (Zhang et al., 2020). They can increase the perceived social presence and face-to-face like interactions (Schultze & Brooks, 2019). We therefore formulate the following research question:

*RQ: How can social interaction and implicit knowledge exchange within digital teams be increased by a virtual work environment?*

To answer this research question, we applied a design science research (DSR) process according to Peffers and colleagues (2008). To this end, we conducted three design thinking workshops to reveal a concrete problem definition and requirements. Based on these first insights, we designed a virtual world by using the platform Gather<sup>1</sup>. This virtual work environment was tested over a period of 4 weeks and evaluated by conducting 16 interviews among all levels of hierarchies in an information systems research group. This research-in-progress paper presents the current status quo as well the next steps according to the design science research approach.

## 2 Background

### 2.1 Digital work

In many organizations, digital work as already been established as the *new normal* (Mirbabaie, Brünker, et al., 2021). This means, that employees are allowed to work from a private place. Working from a private place such as the personal home-office offers a new orbit of freedom for employees, especially for knowledge workers (Wang et al., 2020). These new opportunities often lead to the creation of virtual teams that are distributed across the globe (Frick & Marx, 2021). Therefore, information technologies at the workplace needed to evolve from native office applications to connected digital platforms and virtual worlds to secure successful collaboration (Baptista et al., 2020). Moreover, recent research showed that (AI-based) technology could also be used to deploy virtual assistants as team members within a digital workplace (Mirbabaie, Stieglitz, et al., 2021). Thus, the digitization of the workplace is characterized by evolving technology that connects employees regardless of their location and supports successful collaboration of digital work.

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<sup>1</sup> <https://www.gather.town/> (Accessed: August 16<sup>th</sup>, 2021)

However, in addition to the freedom that digital working establishes, companies also need to consider certain regulations. Thus, digital work does not only mean offering connected digital platforms and new technology, but also reconfiguring current work concepts (A. Richter et al., 2018). Thus, emerging obstacles such as time differences across the globe, reduced social interactions at the workplace as well as the adoption of new organizational structures and processes need to be considered (S. Richter & Richter, 2020). In this context, social software showed a crucial role in the pandemic for maintaining interactions among people and organizations by various digital artefacts and infrastructures (Marabelli et al., 2021). We use social software to refer to a group of digital technologies that enable users to communicate online, create communities, and share multimedia content such as text, images, documents, and videos (Leonardi & Vaast, 2017; Marabelli et al., 2021). As an example, people tried to mitigate social isolation using social media and videoconferencing tools. However, remote work established even more knowledge-based jobs and further training and organizational adjustment is necessary to integrate location-independent jobs into historic work structures (Frick & Marx, 2021). Especially for newly hired workforces, exceptional support and digital infrastructure is needed to secure social interaction and implicit knowledge exchange to better integrate with the team.

## **2.2 Virtual worlds as work environments**

Virtual worlds can be described as “computer-based simulated environments where users, represented “in-world” by avatars, can communicate synchronously over a network” (Goel et al. 2011 p.750). Further research highlights virtual worlds as multimodal graphical communication platforms (Schultze, 2010). Moreover, virtual worlds are characterized as “media-rich cognitively engaging technologies that geographically dispersed organizations can use as a cost effective workplace collaboration tool” (Chandra et al., 2012, p. 797). On those virtual work environments, features such as virtual meetings and interaction with employees can be realized by individual virtual avatars on the platform (Franceschi et al., 2014). Thus, one fundamental aspect of virtual worlds as virtual work environments are social interaction of distributed teams that may facilitate implicit knowledge exchange among the distributed team members (Schultze & Brooks, 2019; Wasko et al., 2011).

Creating and using individual avatars in a virtual world as a work environment may increase media-richness and therefore the immersive nature of the information communication technology compared to traditional video communication tools such as Zoom or Microsoft Teams (Suh et al., 2011). Features such as maneuvering the personal avatar through the virtual world enable new social interaction possibilities like bumping into each other that may help sense making processes (Berente et al., 2011; Goel et al., 2011). This is in line with the findings of Schultze and Brooks (2019) explaining that social interaction helps to increase the social presence of the virtual others in the virtual world. In this context, Suh and scholars (2011) argue that the avatar is perceived as part of the self that can be utilized expressing individual values and characteristics. In contrast, the avatar can also be viewed as technological tool to solve work tasks. Considering recent research on the identity and utilitarian perspective on technology shows that employees can perceive both ways at the same time (Mirbabaie, Stieglitz, et al., 2021). Therefore, avatars may take a crucial role for collaboration, social interaction, and implicit knowledge exchange in virtual worlds.

## **2.3 Factors favoring tacit knowledge exchange in virtual collaboration**

Social interaction is very important for the explicit and implicit knowledge exchange in virtual collaboration. Explicit knowledge describes knowledge about processes that can be codified and communicated. In contrast, implicit or tacit knowledge includes knowledge that cannot be easily quantified and can only be observed through personal interaction and application and which, however, can provide organizations with a competitive advantage (Kotlarsky & Oshri, 2005; Oshri et al., 2007). One approach for encouraging tacit knowledge sharing is to stimulate social identity of teams working in virtual collaboration (Vahtera et al., 2017) by creating social presence (the degree of salience of the other person in an interaction) (Franceschi et al., 2014; Shen et al., 2010). Social identity describes the

identification with other team members and the maintenance of one's own identity by comparing one's own self-concept with the values, norms and characteristics perceived by others and favourable intergroup comparisons lead to a positive social identity (Brown, 2000). In the context of virtual collaboration in a virtual world, the identity can be visualized, for example, by embodying one's gender, age, and social class through an avatar (Schultze, 2010). Furthermore, previous research indicated that social identity is not limited to the identification with human team members, but can also be effected by the identification with certain tools (IT identity) (Mirbabaie, Stieglitz, et al., 2021). IT identity answers the question "Who am I in relation to this technology?" (Carter & Grover, 2015). IT identity results from an individual's interactions with IT and it expresses the intensity of an individual's assessment of the essentiality of a tool for their sense of self. Users with strong IT identities are more likely to use IT more intensively in social contexts such as a work environment (Carter & Grover, 2015). It is therefore important to consider team members' identification with the platform being used for virtual collaboration. If the identity is not considered the exchange of knowledge could be hindered for example through a perceived identity threat. It occurs through the creation of subgroups and leads to conflict between them and knowledge not being share outside of the subgroup. This threat is based on the identities of individuals which can increasingly vary due to new possibilities enabled through virtual teams such as employing individuals with different backgrounds and nationalities (Davidavičiene et al., 2020)

Another aspect influencing social identity and implicit knowledge exchange is group awareness. Group awareness includes aspects such as information about the location of group members, knowledge about their current activities, interests, or mutual feelings (Bodemer & Dehler, 2011). Similar to social presence, it can be generated by a material environment, e.g. in a virtual world (Buder & Bodemer, 2008). Group awareness not only affect social identity, but can also increase trust between team members (Cheng et al., 2021). Trust can be seen as a further success factor for physically distributed teams working in virtual collaboration as it benefits implicit knowledge sharing. In this study, we therefore aimed to create a virtual world that provides a high level of social presence and group awareness to improve predicting factors for tacit knowledge sharing such as social identity, IT identity and trust.

### **3 Research Design**

#### **3.1 Design science process**

Starting from a problem-centered initiation, we developed an applicable artifact following the DSR methodology of Peffers and colleagues (Peffers et al., 2008). We summarized our DSR process in Figure 1. The texts in grey color represent planned and ongoing steps whereas everything else is already completed. The box with the bold border represents the current state in the DSR process. We started with the problem identification. After one year with no end in sight to the Covid-19 pandemic, we reflected on the virtual teamwork in our information systems research group consisting of 26 active members. We decided to follow a systematic DSR approach to solve the identified problems of decreases social interaction and implicit knowledge exchange. As we introduce an innovative concept within IS research which is an applicable solution for an organizational problem, this research can be allocated to the DSR genre of design science research methodology (Peffers et al., 2008, 2018). After comparing different emerging social software tools for virtual collaboration, we decided to test Gather as a supporting platform to improve social exchange within our team. Gather is a video chat platform that tries to innovate the way people meet online by providing customizable virtual worlds with proximity video and audio chats to make virtual interactions more human. In Gather users are represented by customizable avatars which can move within a 2D pixel world which can be designed as a virtual office, a bar, a tropical island or what else the users like as an environment. Besides the proximity voice and video chat with another user, the platform tries to achieve social presence by showing activity indicators such as speech bubbles, emojis or avatar gestures. Gather can be accessed via the browser or a desktop application, in both ways the software can automatically turn off the

camera or microphone by putting the browser/application in the background. Thus, employees do not need to monitor Gather all-day. Therefore, Gather may integrate flawlessly in the work routine in contrast to other video conference software. When employees contact the person for a conversation, Gather sends sound notifications to the employee (e.g., ringing each other). Likewise, employees have the freedom to determine their own activity status (e.g., silence mode or status update). We already gained experience with Gather when applying it as a networking tool for a virtual conference to stimulate social exchange among researchers. After selecting Gather as the appropriate tool, we began the first iteration in the DSR process.

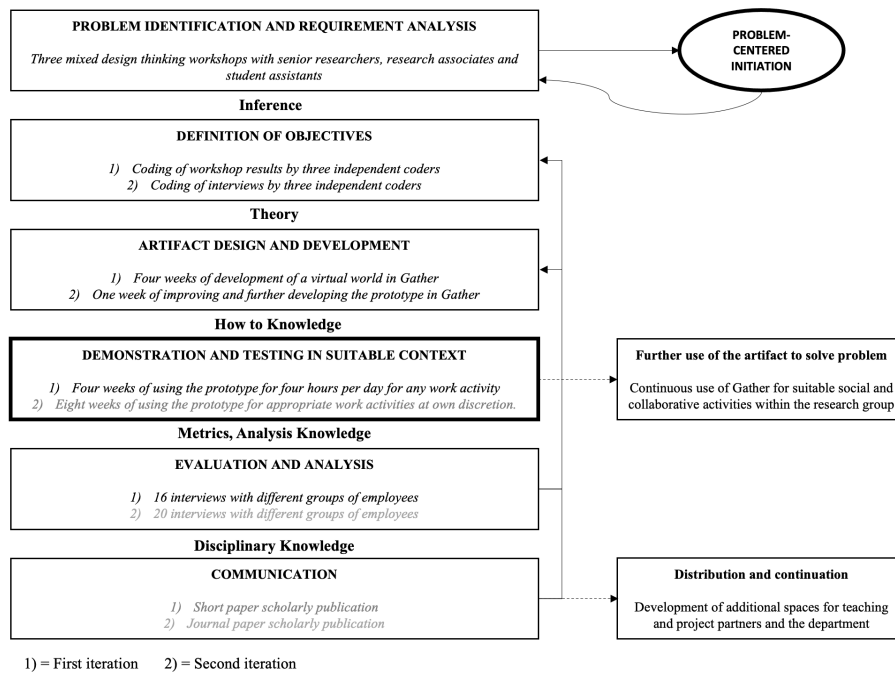


Figure 1. Overview of the applied iterative DSR process (Peffer et al., 2008).

### 3.2 Design thinking workshops and prototype implementation

After identifying the problem and finding a suitable platform in Gather to design our virtual workspace, we sharpened our goals (Peffer et al., 2018). To identify the exact requirements of all members of our research group, we held three design thinking workshops with leaders, research assistants, and student assistants using Mural<sup>2</sup>. In the workshops, we asked about both positive and negative aspects of working from home and gathered requirements for a virtual world that can enhance the positive aspects of digital teamwork and reduce the negative effects. We found – as already assumed – that the biggest barriers to virtual teamwork were the lower social exchange and the resulting low tacit knowledge sharing. Workshop participants also had the opportunity to evaluate various prototypes in Gather and co-create the virtual world graphically. To derive the user stories, the recordings and drafts of the workshops were inductively coded by three independent coders and transferred into user stories. As the requirement analysis was mainly based on the results of the design thinking workshops, they can be accessed via Open Science Framework<sup>3</sup>. The key requirements identified in the workshops can be found in Table 1.

<sup>2</sup> <https://www.mural.co/> (Accessed: August 17<sup>th</sup>, 2021)

<sup>3</sup> [https://osf.io/v8y3w/?view\\_only=8cc2bbe04de74a7da7f5264043b38f90](https://osf.io/v8y3w/?view_only=8cc2bbe04de74a7da7f5264043b38f90)

Requirement type	Requirement	Workshop no.
World design	One connected world with a centralized meeting point	1,2, 3
	Open world and workspaces instead of separated offices in different rooms	1,2,3
	Small world with short walkways	1,2,3
	Demarcation of physical offices by different thematic areas (e.g., tropical island, Zen Garden, mountain lodge, forest, rivers, and meadows.	1,2
Area functions	Leisure room for coffee breaks and small talk	1,2,3
	Meditation room for relaxation and recovery	2
	Brainstorming room with collaboration features	2
	Newsroom for questions and information	1,2,3
	Gaming room for social events and celebrations	1
	Different conference rooms for meetings	1,2,3
	Coworking office for student assistants	2
General features	Indicator of being unavailable	1,2
	Daily news and announcement board	1,2,3
	Interactive whiteboards in every area	1,2,3

Table 1. Overview of the key requirements for the virtual office space.

Based on these requirements, we implemented the first prototype of our virtual office space in Gather using the built-in mapmaker software, Tiled (which is a multi-layer tile editing software) and Adobe Photoshop. We implemented a virtual world consisting of different thematic islands which are located around a central main island in the middle. Each island had various individual and group workspaces, collaborative elements such as whiteboards, and decorative elements to increase immersion. We also made sure that much of the world is displayed on one screen, if possible, both to keep walkways short and to ensure that the activities of other team members are as visible as possible to everyone. After implementing the first prototype, we introduced it to the team and started a testing phase of four weeks. During this period, all employees were required to conduct all internal meetings, team meetings, collaborative arrangements, and small talks on the Gather prototype. We also used it for an informal coffee break, which took place three times a week.

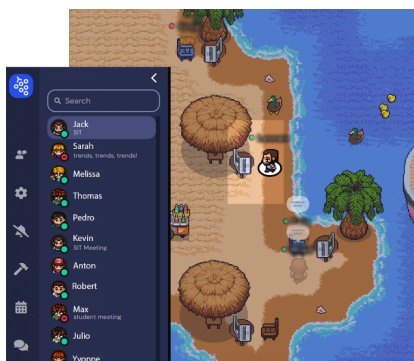


Figure 2. Pseudonymized screenshot showing a section of the virtual workplace artefact.

## 4 Preliminary Findings: Semi-structured Interviews

To evaluate our artifact, we conducted semi-structured interviews with 16 employees (team leader (P10), research associates (P4, P7, P12, P13, P14), and student assistants (P1, P2, P3, P5, P6, P8, P9,

P11, P15, P16)). These interviews were coded by three independent coders. Based on the preliminary interview results, we conclude that information about colleagues currently working as status messages within gather's user interface can **improve the productivity** of employees, compared to working isolated from home without this knowledge. This sentiment was expressed by five participants (P1, P5, P6, P8, P11): *"When I am not in the mood, it's actually good to see other people, that's why Gather is good! It drives me to work"* (P1).

Furthermore, these status messages in addition to speech bubbles above an avatar and avatar movements in the virtual world were reported to increase **group awareness** (Bodemer & Dehler, 2011) by 13 interviewees (P1 - P4, P6, - P15). It seems that the sheer presence of others as avatars in a shared virtual environment increases the sense of community by providing a designated area in the world for meetings where the individuals gather as avatars: *"You can see that the others are active and that increases the team spirit. You can see who is online on the left and see their status. Maybe the avatar too, but the bar indicating who is online is most effective because you don't always see the avatar of others in the world"* (P2).

Furthermore, the utilization of avatars that increase social presence of the colleagues may lead to an increased trust in computer-mediated settings (Schultze & Brooks, 2019). In relation with the effects of working in the virtual world and more information being shared by setting a status representing current activities on group awareness the perceived **team trust** (Hofeditz et al., 2020) was also increased. This increase was further encouraged by the avatar design and more interactions with new employees in addition to cameras and microphones being turned on. This development was reported by five participants (P1, P5, P6, P11, 14): *"Meeting online and switching on the microphone and camera increases trustworthiness"* (P5). *"In order to create trust, it starts with the creation of the avatar, that a personal touch flows into it or that the status is used"* (P6).

One interviewee (P4) felt that **team trust** would be **reduced** by the camera being turned off indicating that the employee does not want to reveal too much of themselves. Furthermore, four other interviewees (P4, P5, P7, P16) articulated that they felt that their private spaces and therefore their private conversations are not shielded enough through the proximity voice chat and bubble functionality where only users within the bubble can hear what is discussed in it that gather provides. *"It does not increase trustworthiness if someone does not turn on their camera"* (P4). *"Although these private spaces already exist, they are still interrupted by colleagues."* (P7).

Four participants (P1, P2, P6, P13) described that the **identification** with the platform was increased by the gamification approach within the tool (P13). Regarding the avatar design four participants (P5, P6, P7, P13) mentioned that they found the variety of design choices to be inclusive and diverse. These individual perceptions can be related to the concept of **IT identity** describing a positive relationship towards the technology and the individual (Carter & Grover, 2015). Likewise, three interviewees (P4, P6, P9) noted that it was increased by the daily usage and embodiment through avatars that were like their own appearance. *"Gather suits me as an employee, because I am personally interested in video games"* (P13). *"My avatar was chosen very deliberately to portray myself, so that I can identify with it and map myself in the digital world"* (P4). *"When designing the avatars, diversity is definitely given in relation to different skin colors or impairments"* (P6).

Lastly, six interviewees (P1, P4, P5, P6, P7, P11) expressed that Gather **increased their communication frequency** with colleagues and in some cases promoted conversations with colleagues with whom they rarely talked compared to other communication tools within the work environment due to the status-, bubble feature and the presence of the avatars in the world signaling availability for conversations. This was further facilitated by scheduled coffee breaks where interested employees could get together on the platform and communicate for 30 Minutes three days a week. *"Everyone is online, and you can walk over and have a conversation without planning it in advance and scheduling a meeting through a shared calendar"* (P11).

Overall, our initial results suggest that the positive influences predominate. Further, the findings reveal that a high-level of group awareness and social presence is provided through our virtual world. In this



context, the interviewees reported increasing social and IT identity, trust, and in interactions among colleagues by using the analyzed virtual world. This may in return encourage implicit knowledge exchange, according to previous findings (Vahtera et al., 2017). During the interviews some participants provided information on several other interesting areas such as privacy concerns, misusing Gather as a monitoring tool, distraction aided by Gather and data protection concerns. These areas of interest will be included in a second iteration through the DSR Process shown in Figure 1.

## **5 Conclusion and Next Steps**

With our study, we contributed to IS design science research by developing a virtual world as a design artifact. As one next step, we aim to derive design principles as a second artifact. Based on our first design science iteration, the preliminary findings suggest that seeing other colleagues (represented by their avatars in the world and by their names being listed online) already encouraged our interviewees in their own work which connects to the results of Schultze (2010). Novel possibilities such as bumping into other avatars open new realms of social interaction that are crucial to foster identification in virtual worlds. Thus, the first design science iteration, contributed on an identity level to IT and social identity theory by evaluating social interaction in a virtual work environment (Carter & Grover, 2015; Mirbabaie, Stieglitz, et al., 2021). In addition, this study emphasizes the supportive role of the corresponding concepts of team trust and group awareness in virtual collaboration (Bodemer & Dehler, 2011; Cheng et al., 2021).

The analysis of our initial interview results also showed that users of the virtual world reported improved group awareness and team identity, thereby drawing on the research of Bodemer and Dehler (2011). Supporting the findings of Mirbabaie and colleagues (2021), we further observed that people which perceived a high level of identity with the virtual world expressed an even higher level of team identity. However, at least one participant commented on the dark side of using virtual worlds for virtual collaboration at the workplace by highlighting possible misuse such as surveillance and data protection issues which could possibly be explained by a technological identity threat (Mirbabaie, Brünker, et al., 2021).

Thus, we aim to consider the identified aspects in the next iteration process strengthen the understanding of advantages and disadvantages related to digital work and virtual workspaces. To this end, the next steps for our work include the further analysis of our interview materials leading to the adjustment of the artifact (step 3). We will then deploy the adjusted prototype in our work setting (step 4) and conduct additional interviews (step 5). We expect to observe changes in the perception of the artifact based on both the findings of this research in progress and the new interviews. For this purpose, we aim to conduct 20 succeeding interviews with the participants using the artifact in a real-world work-setting. Finally, we aim to publish our results in a journal article contributing to digital collaboration and digital work research (step 6). Although some interviewees mentioned aspects that can be interpreted as implicit knowledge exchange, we did not directly quantitatively measure this construct. Future studies may also build on our results by qualitatively measuring the implicit knowledge exchange in a similar Gather environment in comparison to other work environments.

Building on this work, organizations will be able to address the need of their employees for social interactions and facilitate the exchange of implicit knowledge by deploying virtual worlds. This first step is necessary to further develop suitable solutions for digital world based on real-world experiences of employees. We also contribute to information systems research by deriving knowledge on how aspects such as group awareness, social identity, and IT identity are perceived in a virtual world (Bodemer & Dehler, 2011; Carter & Grover, 2015; Cheng et al., 2021; Mirbabaie, Stieglitz, et al., 2021). Therefore, this research in progress can be seen as an intersection that brings together areas of digital work, collaboration, and virtual worlds for further discussions in the research discipline of information systems.

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