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RESEARCH ARTICLE

SOCIAL PRESENCE IN VIRTUAL WORLD COLLABORATION: AN UNCERTAINTY REDUCTION PERSPECTIVE USING A MIXED METHODS APPROACH[1]

Shirish C. Srivastava
Information Systems & Operations Management Department, HEC Paris, 1 Rue de la Libération,
Jouy en Jousas Cedex, 78351, FRANCE {srivastava@hec.fr}

Shalini Chandra
S P Jain School of Global Management, 10 Hyderabad Road,
Singapore 119579 SINGAPORE {shalini.chandra@spjain.org}

The life-like collaborative potential offered by virtual worlds (VWs) has sparked significant interest for companies to experiment with VWs in order to organize convenient, cost-effective virtual global workplaces. Despite the initial hype, recent years have witnessed a rather stagnant use of VWs for collaboration in organizations. Previous research recognizes that the inherent uncertainties within the VW environment are factors limiting their utilization by businesses. Hence, grounding this research in uncertainty reduction theory (URT), we aim to understand the modalities and mechanisms for mitigating the uncertainties and fostering user trust within VWs so that they can be effectively utilized as a workplace collaboration tool. With this end in view, we propose contextualizing and extending McKnight et al.'s (2002) institutional trust framework to the context of VWs by examining the significant role that social presence has in influencing the efficacy of the institution-based trust-building factors of situational normality and structural assurance in VWs. Using a sequential mixed methods approach (Venkatesh et al. 2013; Venkatesh, Brown, and Sullivan 2016), this research integrates results from a quantitative study with findings from a qualitative study to arrive at rich and robust inferences and meta-inferences, with the qualitative method first ***corroborating*** *the inferences obtained from the quantitative research and then* ***complementing*** *them by identifying boundary conditions that may limit the use of VWs in organizations for workplace collaboration. The results together suggest not only the direct but also the interactional (complementary and substitutive) influences of social presence on the relationships of the two institutional trust-building factors to user trust in VWs.*

Keywords: Virtual worlds, uncertainty reduction theory, institutional trust, sequential mixed methods

Introduction

Virtual worlds (VWs) have the potential to transform the global collaboration landscape by enabling real-time, media-rich interactions at a significantly lower cost than other means of communication. With a view to obviating expensive face-to-face interactions, several firms, including IBM, Cisco, Microsoft, Intel, Accenture, and e-Bay, began experimenting with VWs for conducting their global meetings, seminars, training programs, recruitment drives, and even social events (De Vreede et al. 2013). However, notwithstanding the rich collaborative potential offered by VWs, as many as 9 out of 10 business experiments failed within 18 months of their inception (Gonsalves 2008). Moreover, the predictions of

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widespread adoption of VWs by businesses (Gartner 2007, 2008) have not been realized, and to date only a few organizations have actually started using them (see Francino 2015; Levy 2014; Yoon and George 2013). Therefore, research that focuses on the effective adoption of VWs by businesses for collaboration is of value to practice.

Employee reluctance to adopt VWs as collaboration tools is often cited as a major impediment for the effective workplace implementation of VWs (see Nevo et al. 2011; Wasko et al. 2011). Nonetheless, experts sense a big future for VWs in workplace collaborations and compare the current problems in VW implementations to those faced by Web-based e-commerce in the 1990s (see Weinberger 2015). Given their potential as efficient workplace collaboration tools, VWs certainly merit research on the barriers and enablers regarding usage of VWs as collaboration tools.

Studies on VWs (see Appendix A) have generally centered around four broad themes: (1) examining the gaming aspects of VWs (e.g., Chen et al. 2010; Goh and Wasko 2012; Putzke et al. 2010), (2) comparing VWs with traditional communication media (e.g., Franceschi et al. 2009; Nah et al. 2011; Venkatesh and Windeler 2012), (3) identifying unique sense-making experiences of users within VWs (e.g., Berente et al. 2011; Kohler et al. 2011; Zhao et al. 2010), and (4) investigating the different behaviors of VW users (e.g., Animesh et al. 2011; Chesney et al. 2009; Goel et al. 2011; Nah et al. 2010). Some studies have also examined the collaborative potential of VWs (e.g., Montoya et al. 2011; Schmeil et al. 2012; Venkatesh and Windeler 2012), but few studies have examined the organizational use of VWs (Schultze and Orlikowski 2010). Moreover, although previous research recognizes the inherent uncertainties within VW environments as factors limiting their utilization (see Boughzala et al. 2012; Wasko et al. 2011; Yoon and George 2013), mechanisms for mitigating these uncertainties have not been extensively examined. We aim to address these gaps by studying the possible mechanisms that can mitigate uncertainties in order to foster trust in VWs, so that they can be adopted for workplace collaboration.

Research on virtual collaborations has already established the key role played by user trust (e.g., McKnight et al. 1998; Paul and McDaniel 2004). But the lack of colocation, which limits the sharing of social similarities, values, and expectations amongst interacting virtual participants, has been cited as a significant challenge that can impede the fostering of trust in many online environments (e.g., Jarvenpaa and Leidner 1999; Paul and McDaniel 2004). Moreover, during the early phase of e-commerce development, most online interactions were devoid of social cues represented in a shared three-dimensional virtual space. McKnight et al. (2002), in their nomological network for institution-based trust in the online e-commerce environment, proposed only the key roles of the broad Internet environment—situational normality and structural assurance—as significant trust-building factors without incorporating elements of colocation and socialness. Situational normality is the belief that the online interactional environment is normal and favorable for successful dealings with other interacting members, whereas structural assurance indicates the presence of protective structures such as guarantees, regulations, safety nets, promises, and operational procedures, conducive to situational success (McKnight and Chervany 2001). In their institution-based trust model, McKnight et al. (2002) did not incorporate elements of colocation and socialness as these were not commonly present in the online technological tools available in those times. However, VWs mark a transition from the prior context of Web-page-based online environments, such as e-commerce, to cognitively rich Web-place-based environments, such as VWs where users have the ability to be socially present and display their behaviors and emotions through their *avatars* (Gonsalves 2008). This enhanced sense of close social interaction in VWs, referred to as *social presence,* clearly differentiates VWs from many other previously examined online contexts, such as e-commerce. We believe that research that contextualizes extant theories to incorporate the unique element of social presence in VWs will reveal unique modalities for fostering workplace utilization of VWs and thereby make an important contribution to the literature (see Alvesson and Kärreman 2007; Hong et al. 2014). It must be noted that VWs were essentially developed for recreational gaming environments, where the aspect of uncertainty (and risk) is a less salient concern than it is regarding their potential use for organizational tasks (Nevo et al. 2011). Nonetheless, for organizational adoption of VWs, it should be easier to target and motivate employees who have already used VWs for recreation (see Bassellier et al. 2003; Neufeld et al. 2007; Nevo et al. 2011). Therefore, the objective of this research is to examine the mechanisms that motivate recreational VW users to utilize VWs for collaboration in their workplace.

Previous literature on technology acceptance identifies *emergent use* as the use of an existing technology for performing new tasks for which it was not designed (Hsieh and Wang 2007; Saga and Zmud 1994). We posit uncertainty mitigation and trust development as the primary challenges for facilitating *emergent use intention* (EUI) to utilize VWs in workplace collaborations. Emergent use is when an existing technology is used in new areas for performing new tasks that were not previously foreseen as capabilities of that technology (Hsieh and Wang 2007; Saga and Zmud 1994). For example, VWs were originally seen as having recreational capabilities and their use for collaborative organizational tasks is an emergent use.

Situating our discussion in uncertainty reduction theory (URT; Berger 1979; Berger and Calabrese 1975) and contextualizing the discussion to VWs by incorporating the key role that "social presence" plausibly plays in building trust through reduction of uncertainties, we examine the significant effects of social presence in fostering both user trust in VWs and EUI for their utilization. In addition to the direct effect, we propose the moderating influence of social presence on the relationships between the institution-based trust factors (situational normality and structural assurance) and user trust. Essentially, we use context-based theorization (Alvesson and Kärreman 2007; Bamberger 2008; Hong et al. 2014; Johns 2006) to augment McKnight et al.'s (2002) institutional trust model for the VW context. The two questions that we seek to address are:

RQ#1: Does social presence influence user trust and the efficacy of institution-based trust-building factors in VWs to enable the use of VWs for workplace collaboration?

RQ#2: What are the implications of user trust for emergent use intention for VWs as workplace collaboration tools?

The research questions for the present study seek to extend existing theories of "trust in virtual platforms" by incorporating the unique contextual nuances of VWs (see Alvesson and Kärreman 2007; Hong et al. 2014). To this end, a holistic approach is needed to develop a substantive theory for trust in VWs. We use a sequential mixed methods research approach to answer these questions by integrating results from quantitative and qualitative studies, to arrive at rich and robust inferences and meta-inferences (Venkatesh et al. 2013; Venkatesh, Brown, and Sullivan 2016). Our work makes two primary contributions. First, we contribute to the literature on online trust by contextualizing the online institutional trust model (McKnight et al. 2002) to the VW context through describing the direct and moderating influence of social presence in addition to the previously recognized trust-building antecedents of structural assurance and situational normality (see Hong et al. 2014). Second, we bring in URT, a theory from communications research, to the VW literature, and in doing this we bring a new perspective for understanding the mechanisms through which situational normality and structural assurance serve to build user trust along with a rationale for incorporating social presence in the institutional trust model for VWs.

Background

Emergent Use of Virtual Worlds as Workplace Collaboration Tools

Virtual collaboration can be described as the working together of a group of geographically dispersed individuals to accomplish a task through technologically enabled media (see Xu et al. 2012; Zheng et al. 2013). Increasing workforce globalization is propelling organizations to continuously search for new virtual collaboration tools, and VWs are one such platform (Goel and Mousavidin 2007; Suh et al. 2011). Early research on the use of VWs as collaborative tools was restricted to the massively multiplayer online game (MMOG) context, where the influence of real world player characteristics and their mutual dependencies in the gaming network were analyzed in relation to their collaboration effectiveness (Chen et al. 2010; Goh and Wasko 2012; Putzke et al. 2010). Recognizing the potential of VWs, researchers extended collaboration studies within the VW gaming context to other contexts, such as examining the processes behind virtual cocreation (Kohler et al. 2011), understanding collaborative learning experiences (Schmeil et al. 2012), relating collaborative behaviors to performance (Montoya et al. 2011), and comparing traditional collaborative technologies with VWs as a collaboration tool (Venkatesh and Windeler 2012). However, utilization of VWs for organizational use, specifically for workplace collaboration, is currently in a nascent stage. The present work can help provide organizations with some direction for leveraging VWs for the emergent use of workplace collaboration. Although the concept of *emergent use* was previously introduced in the literature, empirical research on the subject is rather limited, possibly because the bulk of IS research focuses on applications developed for specific uses. In contrast to such prior research, we examine the *emergent use intention* (EUI)—the individual-level intention of recreational VW users to utilize VWs for future workplace collaborations. But VW environments have several inherent uncertainties that need to be appropriately addressed prior to their being utilized for workplace collaborations.

Uncertainties in Virtual Worlds

Collaboration through VWs involves several identity, authentication, and security risks (Gartner 2007; Venkatesh and Windeler 2012). First, VWs users communicate and collaborate through their computer-generated personas or avatars. Because of the anonymity of VW environments, individuals may not readily trust the virtual identities represented by avatars. Even within an organizational environment, where

anonymity is not an issue, an avatar may not display a member's real attributes. Avatars can be used to portray a VW member's unrealistic aspirational alter ego. Moreover, virtually interacting members can easily hide information (Hassanein and Head 2007) and their behaviors cannot be guaranteed (see Moverman 2013; Pavlou et al. 2005; Ridings et al. 2002). This adds to the risks and uncertainties perceived by the VW users. Second, VWs make it possible to bring together people of diverse backgrounds for collaboration, which creates potential for conflict (see Kankanhalli et al. 2007). Technology mediation makes it harder for people to resolve conflict, which further exacerbates uncertainties. Third, the use of unverifiable applications and the lack of identity controls can amplify the uncertainties associated with VW interactions (Havenstein 2007). Although the third concern may be less relevant in organizational settings, in our context, participants would have experienced such uncertainties earlier, when using VWs in recreational settings. In addition to all of these uncertainties, the general perception that VWs are primarily for recreational use can further inhibit their use in the workplace. To facilitate the use of VWs for workplace collaboration, the interacting members need to trust the efficacy, reliability, and safety of the VW environment.

User Trust in Virtual Worlds

Trust generally forms the basis for all social interactions and influence, especially in situations featuring risk and uncertainty (McKnight et al. 2011; McKnight et al. 2002; McKnight et al. 1998). In the context of online environments, user trust is described as the user's willingness to believe in the trustee for enabling interactions (McKnight et al. 2002). VW users, represented through their avatars, may perceive several risks and uncertainties that are related to the lack of interactional regulation and also apparent technological vulnerabilities (Havenstein 2007). Trust can help overcome these perceptions of uncertainty, helping users engage in "trust-related behaviors" with other VW members for collaboration in their workplace (see McKnight et al. 2002, p. 335). Thus, in the context of our research, user trust in the VW is conceptualized as the user's overall willingness to believe in the VW.

Similar to the usage motivations in other online environments, VW user motivations are centered on fostering adequate user trust (Chandra et al. 2010; Pavlou et al. 2005; Teo et al. 2009). Inadequate trust in a VW environment need not interfere with its use for recreational applications. But when individuals decide to use VWs for collaboration in the workplace, where the stakes for task completion are significantly higher, we expect user trust to play a salient role. Trust can be fostered by mitigating environmental uncertainties and has been found to significantly influence behavioral intentions in different kinds of Web interactions (Gefen and Heart 2006; Jarvenpaa and Leidner 1999). Hence, consistent with past research in different contexts (e.g., Awad and Ragowsky 2008; Pavlou 2003), we expect enhanced user trust to positively influence the EUI for utilization of VWs in workplace collaborations. We therefore examine the uncertainty reduction mechanisms through which trust is fostered in VWs.

Uncertainty Reduction Theory and Virtual Worlds

Uncertainty reduction theory (URT) suggests that when individuals encounter new situations, their primary focus is on reducing the associated uncertainties (Berger 1979; Berger and Calabrese 1975). Individuals use their communication with interaction partners to seek relevant information for mitigating inherent risks and associated anxieties (Griffin 2009). Broadly, URT seeks to explain and predict when, why, and how individuals use information-seeking behavior to minimize their doubts about their interaction partners (Berger and Bradac 1982) which can also be technology-based platforms. Generally, lower levels of uncertainty result in less information-seeking behavior, and vice versa.

Prior research has leveraged URT to explain a variety of situations, such as the uncertainty reduction strategies used by members of social networking sites to gain information about someone they recently met online (Antheunis et al. 2010), strategies for seeking social information via computer-mediated communication (Ramirez et al. 2002), perceived information adequacy and uncertainty reduction in doctor–patient interactions (Sheer and Cline 1995), and uncertainty reduction processes for increased intimacy in romantic relationships (Theiss and Solomon 2008). But URT can also be used to describe uncertainty reduction strategies that individuals adopt when interacting with technology based systems. For example, in a recent study, URT has been leveraged in IS literature to examine how citizens' uncertainty in e-government services can be managed (Venkatesh, Thong, Chan, and Hu 2016). Similar to the above-mentioned contexts, VW users also experience several uncertainties and URT can be a useful lens for examining such concerns.

Theory

Linking Uncertainty Reduction Strategies to Institutional Trust Mechanisms

Trust, which is the "perception of the degree to which an exchange partner will fulfill their transactional obligations in situations characterized by risk or uncertainty" (Bailey et al. 2003, p. 312), may develop in several ways in VWs. From a theoretical as well as a practical perspective, it is important to understand the mechanisms through which trust is fostered in a VW for workplace collaboration. URT seeks to explain and predict the ways in which individuals use information and communication to reduce uncertainties and ambiguities, and identifies three types of uncertainty reduction strategies: *active, passive*, and *interactive* (Berger and Calabrese 1975). By providing additional information, these strategies enable users to trust technology-enabled interaction platforms, such as VWs, by mitigating the prevailing uncertainties (see Antheunis et al. 2010; Srull and Wyer 1989). An *active strategy* for uncertainty reduction involves active observation and interpretation of an individual's surroundings to gather clues and information about the individual's interaction partners. In contrast, a *passive strategy* involves relying on information about the interactional environment from a third party, rather than playing detective oneself. Finally, an *interactive strategy* is a social strategy wherein individuals interact with their collaboration partners to obtain the necessary information for reducing uncertainties. We posit that the uncertainty reduction strategies of URT correspond with the institutional trust-building mechanisms (situational normality and structural assurance) as described in McKnight et al.'s (2002) model of online trust as shown in Figure 1.

Situational normality in a virtual environment is experienced when individuals actively assess the interactional environment as favorable for successful dealings with other interacting members (McKnight et al. 2002; McKnight et al. 1998). The *active uncertainty reduction strategy* closely corresponds to the institutional trust-building mechanism of situational normality where individuals actively observe their surroundings and gather informational clues about other interactional members. When the situation appears to be safe and normal, users will tend to believe that the interactional environment is appropriate and trustworthy (McKnight et al. 2002; McKnight et al. 1998). Thus, if the observed attitudes, intentions, and behaviors of other VW members are appropriate, individuals using VWs will develop perceptions of situational normality and consequently believe that VWs are trustworthy enough for workplace transactions. Previous research has also demonstrated that appropriate interactions amongst transacting parties are the foundation for online trust (Lee and Turban 2001). In the context of VWs, the interacting parties are the other VW members, and hence anticipated levels of situational normality will positively influence the development of user trust in VWs.

Structural assurance concerns individuals' passive reliance on existing structures, such as guarantees, regulations, safety nets, promises, and operational procedures (Gefen et al. 2003; McKnight et al. 2002; McKnight et al. 1998), to assess whether VWs are safe, secure, and reliable for workplace transactions. Structural assurance closely corresponds to the URT *passive uncertainty reduction strategy*, in which individuals rely on third-party information. Previous research on online collaboration has also shown that multiple uncertainties can be mitigated through various forms of structural assurances such as rules, regulations, encryption, digital signatures, and third-party certifications (Ratnasingham et al. 2005; Zissis and Lekkas 2012). In the case of VWs, third-party information in the form of guarantees, regulations, and other structures are instrumental in providing the required structural assurance to VW users. In their model for online trust, McKnight et al. (2002) also suggested that structural assurance plays a key role in enhancing users' trusting beliefs regarding uncertain technological situations. Thus, structural assurances realized through a passive third-party uncertainty reduction strategy will be instrumental in fostering user trust in VWs.

Although McKnight et al.'s (2002) model corresponds well with the elements of the active and passive strategies for uncertainty reduction as described by URT, it does not take into account the role of *interactive strategies*, possibly because e-commerce websites appear to be constrained with respect to the "social dimension." In fact, McKnight et al. acknowledged that it is difficult to reduce uncertainties and establish trust through the Internet, as the opportunities to display "social cues are minimal" (p. 335). However, with the transition from two-dimensional e-commerce *web pages* to three-dimensional VW *web places*, where virtual users have the ability to display facial expressions and emotions and interact with a sense of colocation, McKnight et al.'s institutional trust-building antecedents need to be revisited to incorporate the elements of *socialness* that are present in VWs (Berente et al. 2011; Davis et al. 2009; Wasko et al. 2011). Socialness describes the technological conditions that human beings require for establishing awareness of colocation and copresence in a technology-mediated environment (Goel et al. 2013; Goel and Prokopec 2009) and closely corresponds to "social presence" for virtual interacting members.

Moreover, URT's third uncertainty reduction strategy also directs us to consider the interactive strategy as a potential

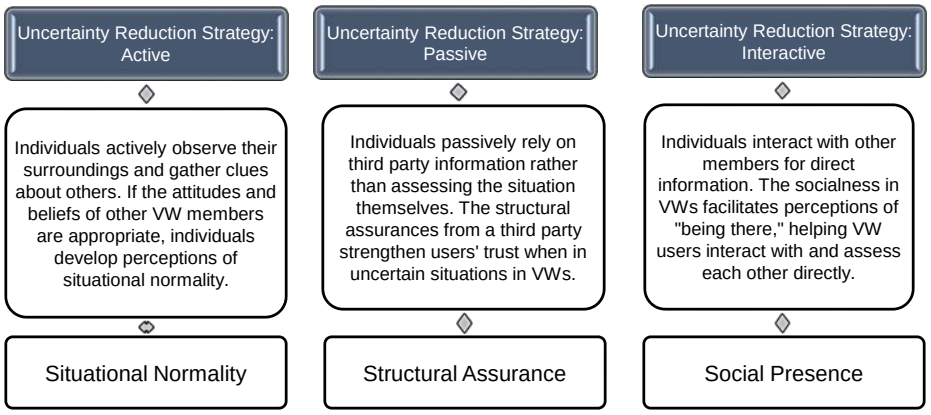

Figure 1. Uncertainty Reduction Strategies Linked to Trust-Building Perceptions in VWs

mechanism for fostering trust. The interactive uncertainty reduction strategy involves individuals going straight to the source to interact with it in order to acquire information, rather than depending on active and passive strategies alone. Hence, grounding our arguments in URT's interactive uncertainty reduction strategy and contextualizing McKnight et al.'s institutional trust model to VWs, we propose *social presence* as an additional institutional trust-building antecedent in the VW context. Thus, the active, passive, and interactive strategies together can be used to develop perceptions of situational normality, structural assurance, and social presence.

Social Presence in Virtual Worlds

Social presence, described by social presence theory, captures the extent to which a medium is perceived as conveying the presence of the interacting participants (Venkatesh and Johnson 2002). It is the sense of being together in a virtual environment with one another as real societal members (see Biocca et al. 2003). VWs have a high degree of social presence, as they incorporate several communication cues, such as the facial expressions, gestures, and bodily movements of avatars in addition to verbal and textual communication (Franceschi et al. 2009). Due to social presence, the user perceives distant entities as being close, which increases their felt intimacy and psychological closeness (Choi et al. 2001). The perceived social distance between the collaborating members is thus diminished, and they may view virtual meetings as analogous to traditional face-to-face meetings (see Kumar and Benbasat 2002). Building on McKnight et al.'s (2002) online trust model, we posit that *social presence* not only acts as a salient relational cue for developing user trust among virtually interacting members (direct effect), but also serves to enhance/attenuate the influence of institutional trust-building antecedents on that trust (moderating effect).

Hypothesis Development

Institutional Trust Antecedents and User Trust: Uncertainty Reduction Theory Perspective

As discussed in previous sections, individuals employ three different information access mechanisms to mitigate uncertainties, namely, *active*, *passive*, and *interactive* strategies. Contextualized to the specific case of VWs, these three strategies correspond to the three institutional trust-building mechanisms, namely, *situational normality*, *structural assurance*, and *social presence*. McKnight et al.'s (2002) online trust model has already established that situational normality and structural assurance are significantly related to user trust in the context of e-commerce. Hence, we augment and contextualize McKnight et al.'s model of online trust for application to VWs by examining the significant role of social presence in influencing the efficacy of institution-based trust building factors in VWs. Our research model (along with the control variables) is presented in Figure 2.

Relationship of Social Presence to User Trust

Social presence facilitates fostering of user trust in VWs through four different but related mechanisms. First, cognitive states associated with social presence shape the sense-making mental models of other virtually interacting members and assist in providing cues during uncertain situations. As proposed by Biocca and his colleagues (e.g., Biocca et al.

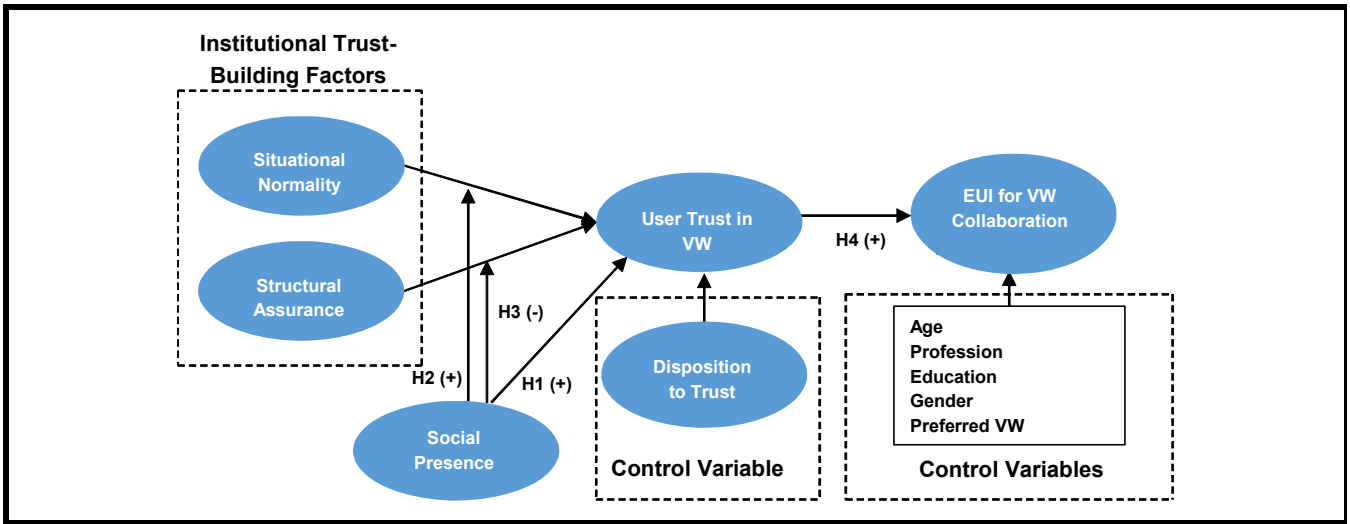

Figure 2. Research Model and Proposed Hypotheses for Virtual Worlds

2003; Nowak 2001; Nowak and Biocca 2001), these mental models of virtually interacting members are immediately activated during uncertain situations, thereby providing heuristic cues to the intentions of other virtual members. We expect that such cues can help VW users better understand their relational environment, thereby fostering user trust in the VW. Second, prior research has related social presence to the two social psychology concepts of intimacy and immediacy in relationships and suggested that available social cues influence relationships amongst interacting members (Biocca et al. 2003; Rice 1993). The social dimensions of virtual environments regulate the levels of immediacy and intimacy that virtual participants perceive regarding other avatars in a VW (Franceschi et al. 2009). Thus, by invoking the cognitive states of immediacy and intimacy, social presence reduces the perceived relational risks. This again is expected to facilitate user trust in VWs. Third, by facilitating close lifelike interactions, social presence facilitates the development of mutual understanding amongst VW members (Biocca et al. 2003; Savicki and Kelley 2000). This developed mutual understanding also contributes to the development of user trust in VWs. Fourth, social presence influences information privacy and security concerns by reducing the social distance between interacting members (Pavlou et al. 2007). The reduced social distance reduces the risks for the VW users, which in effect increases their confidence in using the VWs for collaborative tasks. Thus, perceptions of social presence for collaborative tasks in VWs contribute to fostering of user trust in VWs. Hence, we hypothesize:

Hypothesis 1: In the VW context, social presence is positively associated with user trust.

Social Presence as a Complement to Situational Normality

Situational normality provides information about the favorability of the interactional environment for conducting dealings with other interacting members. In the context of VWs, members can observe their surroundings and actively gather clues about the attitudes, intentions, and behaviors of other VW members to assess the situation. We expect that when the situation is perceived to be safe and normal, users will tend to believe that the interactional environment is acceptable (McKnight et al. 2002; McKnight et al. 1998). This sense of normality mitigates the inherent uncertainties, and user trust is fostered.

But VWs are also imbued with *socialness*, which includes simultaneous representation of several interacting members using verbal and nonverbal communications such as gestures and a display of emotions, which enhances their social presence (Franceschi et al. 2009, Goel et al. 2013). This enhanced social presence provides additional information about how other VW members actually behave and also provides VW members with the opportunity to experience and verify the relational attitudes of interacting members. By presenting an experiential opportunity for an almost lifelike interaction between VW members, social presence provides additional substantiation information about VW community members than can be gathered by active observation alone (Venkatesh and Johnson 2002). In effect, this experiential information reinforces the information gathered by active observation. Social presence also helps users map and verify the observed social cues (such as gestures and other nonverbal cues) to

their previous assessments of situational normality, thereby strengthening the influence of situational normality in reducing uncertainties. In addition, due to enhanced social presence, VW users understand the meanings attached to the subtle reactions and emotions displayed by interacting members, which provides additional assessment information (Venkatesh and Johnson 2002). This also tends to reduce uncertainties and strengthen the influence of situational normality on user trust. Thus, we expect that a higher degree of social presence provides additional social cues that strengthen the reliability of information provided by the situational normality. This further contributes to the reduction of uncertainties and development of trust.

Research shows that VW users increase their social presence by enthusiastically occupying their avatar bodies in ways that are quite similar to real life (Rosenberg et al. 2013; Torisu 2016). The virtual representation and behavior reveal a lot about a person's real personality (see Frontline 2009). As users begin to have a personal affinity with their avatars and are able to create better social and emotional connections, they have a deeper understanding of their interactional environment, which adds to the role that situational normality plays in reducing uncertainties and increasing trust (see Bizshifts-Trends 2014). Thus, from a URT perspective, complementary information from enhanced social presence strengthens the relationship between situational normality and user trust. Hence, we hypothesize:

Hypothesis 2: In the VW context, social presence positively moderates the relationship between situational normality and user trust such that the relationship becomes stronger for higher levels of social presence.

Social Presence as a Substitute for Structural Assurance

Structural assurance, or the belief that "structures are in place to promote success," is just one of the many cues that cause people to develop trust in another entity (McKnight et al. 2002, p. 339). Structural assurance provides information about the efficacy of existing structures such as guarantees, regulations, safety nets, promises, and operational procedures. In the context of VWs, users can look for information conveyed through these structural assurance mechanisms to mitigate security, privacy, and other concerns. When individuals find these assurances to be adequate, uncertainty is mitigated and trust is fostered. But as previously discussed, VWs are imbued with a high degree of social presence, which also helps mitigate uncertainties by reducing perceived social distances between interacting members. Moreover, social presence provides an opportunity for VW members to directly experience the environment, thereby providing direct information about the environment that is richer than what can be gathered from third parties alone (Venkatesh and Johnson 2002). In fact, because social presence provides immersed experience, the need to verify the credentials of other members and the safety of the environment through third party sources may be mitigated. In a similar vein, we expect that a higher degree of social presence and the associated lifelike experience will cause virtual members to have fewer concerns about information privacy and security.

Prior research has found that because general customer awareness of third-party assurances provided in websites (such as seals of approval) is relatively low (Head and Hassanein 2002), social presence is artificially injected into such websites through reviews from real customers who have experienced the product or service. This experiential sharing from past customers is expected to increase prospective customers' trust in the e-retailer (Mudambi and Schuff 2010). For example, the accounting software company Xero enhances its social presence by providing appealing photos of its customers together with quotations about why they have used Xero (Basu 2013), and Book Depository has a live feed on Google Maps showing real people around the world ordering books from them. Such initiatives for enhancing social presence replace the need to have rating agencies' institutionalized third-party certifications for the purpose of building user trust (Basu 2013). Thus, as the information provided by enhanced social presence and the associated experience tends to *substitute* for the evaluative information accessed from third-party sources for reducing uncertainties, from a URT perspective, social presence weakens the relationship between structural assurance and user trust. Hence, we hypothesize:

Hypothesis 3: In the VW context, social presence negatively moderates the relationship between situational assurance and user trust, such that the relationship becomes weaker with higher levels of social presence.

User Trust and Emergent Use Intention (EUI)

As discussed earlier, VWs have a number of uncertainties that need to be mitigated to provide reassurance to users. Trust, which is an underlying precept for effective social exchange (see Blau 1964), can be one such mechanism. The role of trust becomes particularly important when targeted potential users have previously utilized VWs for recreational tasks, where the concerns are different. If users intend to use VWs

for workplace collaborations, they should trust the VWs as being suitable for the intended purpose. Lack of adequate user trust could prevent current recreational VW users from using VWs for workplace collaborations, as they will be concerned about the associated uncertainties.

Following arguments proposed by the theory of reasoned action (see Venkatesh et al. 2008), which states that beliefs lead to attitudes, which in turn lead to behavioral intentions, we posit trust as an important belief that creates positive attitudes, which in turn impact EUI (see Venkatesh et al. 2000; Venkatesh et al. 2003). The perceptions of presence and copresence inherent in VW interactions reduce multiple communication ambiguities, and this in turn mitigates the uncertainties involved in collaborating through VWs. The perceptions of minimized risk contribute significantly to developing user confidence about the efficacy of the medium, thereby facilitating EUI for collaborative utilization of VWs.

Past research has shown that trust has an important impact on virtual members' performance and attitudes such as satisfaction, as well as behavioral outcomes (Costa et al. 2001; DeRosa et al. 2004). Moreover, several researchers have empirically validated the positive relationship of trust to behavioral intentions for using IS in different contexts (e.g., Kim et al. 2008; Pavlou and Gefen 2004; Pavlou et al. 2007). Dirks and Firrin's (2001) research also supports that trust reduces uncertainties and ambiguities in social perceptions, thereby facilitating positive attitudinal and behavioral outcomes. Hence, we hypothesize:

Hypothesis 4: User trust in a VW is positively associated with an emergent intention to utilize the VW for workplace collaborations.

Method and Results

We adopt a mixed methods approach to test and substantiate the proposed research model by combining quantitative data collected through a survey with qualitative data from interviews. For our data analysis and presentation, we closely follow the approach suggested by Venkatesh et al. (2013) for leveraging the full potential of the mixed methods research. We first discuss the appropriateness of the mixed methods approach for the research context and then develop meta-inferences to formulate a substantive theory for the examined context.

The *appropriateness* of utilizing a mixed methods approach should be primarily justified by the research questions, objectives, and contexts, rather than by the core purpose of conducting the research enquiry (Venkatesh et al. 2013; Venkatesh, Brown, and Sullivan 2016). The research questions for the present study seek to extend existing theories of "trust in virtual platforms" by incorporating the unique contextual nuances of VWs (see Alvesson and Kärreman 2007; Hong et al. 2014). To this end, we ground our arguments in URT, a theory that is relatively underexplored in IS contexts. Hence, a holistic approach is needed to develop a substantive theory for trust in VWs. In accordance with our research objectives, we sampled and surveyed only recreational users of VWs in our quantitative study to examine their willingness to extend their VW usage to workplace settings. However, for a robust understanding of the phenomenon, which is relatively new, it is crucial to *corroborate and confirm* the inferences from the quantitative study with another study that utilizes data from a dissimilar set of users and takes a different perspective. For the latter, we conducted in-depth interviews with experienced workplace users of VWs. The follow-up qualitative study thus provides additional *complementary* insights from an alternative divergent perspective for a deeper understanding of the VW phenomenon (see Goel and Prokopec 2009; Scott 2000).

To summarize, the two primary purposes of the mixed methods research methodology used in this study are the *corroboration/confirmation* and *complementarity* of the findings, and a sequential mixed methods approach is suitable for these purposes. We use triangulation to corroborate and confirm the findings by situating the deductions from the qualitative analysis within the results obtained from the quantitative analysis. The qualitative interview data thus help us assess the credibility of the inferences obtained from the quantitative survey (Venkatesh et al. 2013). In addition, our use of a qualitative method to acquire complementary in-depth views about the phenomenon is helpful for assessing the *boundary conditions* for the results from the quantitative study—thereby opening fresh avenues for future research (Venkatesh et al. 2013). Finally, because we seek to extend theories of trust, which already have a strong theoretical foundation (although new to the VW context), we conducted the quantitative study prior to the qualitative study in our sequential mixed methods approach (see Venkatesh et al. 2013; Venkatesh, Brown, and Sullivan 2016).

Having described the *appropriateness* of adopting a mixed methods approach for this research, the next steps in leveraging its full potential are to develop meta-inferences and validate their quality. Inferences in mixed method research are largely guided by the researchers' construction of the relationships among the different variables through a quantitative analysis that is corroborated by a qualitative analysis of

the respondents' perceptions, behaviors, and feelings in a coherent and systematic manner. Meta-inferences are thus obtained in mixed methods research by integrating and synthesizing the findings from the quantitative and qualitative analyses (Venkatesh et al. 2013). To develop these meta-inferences and assess their quality, it is imperative to first discuss the quantitative and qualitative research separately in terms of their *design, analysis*, and *inferences*. Following Venkatesh et al.'s (2013) integrative framework, we highlight aspects related to the *design quality* and *explanation quality* of quantitative and qualitative research while discussing our design, analysis, and inferences. We describe the inferences from our quantitative research in relation to the theorized research model (Figure 2) and we integrate the findings from the quantitative research into our description of the inferences from the qualitative research to identify meta-inferences. We subsequently use complementarities and contradictions discovered in the qualitative data to identify the boundary conditions limiting the corroborated meta-inferences, thereby developing a substantive theory for user trust in VWs.

Quantitative Method: Survey Design and Design Validity

To test the research model in Figure 2, we first developed a survey instrument (with items on a seven-point Likert scale ranging from *strongly disagree* to *strongly agree*) by identifying and adapting appropriate measures from the existing literature, where psychometric properties have already been established (Appendix B). We tested the designed preliminary questionnaire with three doctoral students who were recreational VW users. We incorporated their feedback about the readability and clarity of the survey items in the final instrument.

The sampling frame comprised VW users who use VWs for recreational activities (such as fun, gaming, and socializing) rather than for work-oriented activities like collaborations, and this was indicated as the qualifying criterion for the respondents, enforced via a question in the survey. We individually distributed paper-based questionnaires to 312 part-time students at two large universities in Singapore. All respondents had previous work experience. We asked the respondents if they were willing to use VWs for workplace collaboration in their respective contexts. In the instructions given to the respondents, we asked them to respond to the questions by visualizing their preferred VW website among those they have used. We received responses from 226 participants, of which 197 were usable; we excluded incomplete questionnaires and/or respondents who did not meet the qualifying criterion from our analyses. The high response rate is attributable to the fact that the survey was administered individually with the help of a few doctoral students.

In addition to the focal research constructs, we incorporated suitable control variables in the research model (see Figure 2). We controlled for the intermediate user trust variable via disposition to trust, as McKnight et al. (2002) found this to have a significant relationship with user trust. Further, consistent with previous technology adoption research, we controlled the final dependent variable—EUI—with demographic variables such as gender, age, and profession (IT or non-IT; see Phang et al. 2010; Venkatesh et al. 2003). In addition, we controlled for the preferred VW (Second Life or others).

Appendix C provides the demographics of the survey respondents. Among the 197 respondents, 42.6 percent were men and 57.4 percent were women. The average age of the respondents was 29.3, with a standard deviation of 5.8. Further, all of the respondents were highly educated; more than 70 percent of the respondents had a graduate degree. Most respondents had more than 10 years of Internet experience. A majority of the respondents (78.7%) reported Second Life as their preferred VW, whereas others preferred VWs such as Kaneva and World of Warcraft.

For our data analysis, we used partial least squares (PLS), a latent structural equation modeling technique, as implemented in SmartPLS 2.0, which utilizes a component-based path modeling application (Ringle et al. 2005). PLS avoids the two major problems of inadmissible solutions and factor indeterminacy and thus is suited for analyzing models with latent variables (Fornell and Bookstein 1982; Pavlou and Gefen 2005; Wold 1985). It is also well suited for estimating moderating effects (Pavlou and Gefen 2005), which we do in our study. Finally, many IS studies have employed PLS and found it to be an effective method for data analysis (e.g., Sykes 2015; Sykes et al. 2009; Venkatesh and Windeler 2012).

Measurement Model

Following the recommended two-stage analytical procedure (Anderson and Gerbing 1988; Hair et al. 1998), the first stage of the data analysis evaluates the measurement properties of the instruments, while the second stage examines the structural relationships. To assess the measurement model, we tested three types of validity: content validity, convergent validity, and discriminant validity. Content validity assesses whether the chosen measures appropriately capture the full domain of the construct (Straub et al. 2004). We examined content validity by checking for consistency between the

measurement items and the existing literature. This was done at the stage of designing the questionnaire.

Convergent validity checks that the indicators for a construct are more correlated with one another than with the indicators of another construct (Petter et al. 2007). As can be seen in Appendix D, the factor loading values (shaded) show that there is a strong correlation between each of the items and their corresponding construct. This demonstrates convergent validity. We further tested convergent validity by examining the composite reliability (CR) and average variance extracted (AVE: the ratio of the construct variance to the total variance among indicators) for the indicators (Hair et al. 1998). The suggested CR threshold for reliable measurement is 0.70 (Chin 1998). As can be seen in Appendix E, the CR values ranged from 0.86 to 0.97. For the AVEs, 0.50 is the recommended threshold (Fornell and Larcker 1981). Appendix E shows that all AVEs were above the minimum threshold; they ranged from 0.68 to 0.91. In addition, as Appendix B shows, the high Cronbach alpha values, ranging from 0.76 to 0.96, confirm the reliability of all scales.

We verified the discriminant validity by examining the square root of the AVE, as recommended by Fornell and Larcker (1981). The values of the square root of the AVE (shown on the diagonal in Appendix E) are all greater than the inter-construct correlations (the off-diagonal entries in Appendix E), thus exhibiting satisfactory discriminant validity. Further, the cross-loadings of the items on other constructs (Appendix D) are quite low, which again indicates discriminant validity. We checked for multicollinearity of our predictors by calculating the variance inflation factor (VIF), which ranged from 1.37 to 2.32. As all VIF values are less than 5 and all correlations among variables are below 0.80, there are no significant multicollinearity problems (Hair et al. 2006). To preclude the possibility of common method bias contaminating the results of our research, we took several steps to reduce the bias during data collection and performed tests to assess their impact and found them to be satisfactory, as shown in Appendix F.

Structural Model

Table 1 presents the results[2] of the different structural models, showing the control variables only model, the direct effects only model, and the interaction effects model, for the intermediate dependent variable of user trust (UTR) and the final dependent variable of emergent use intention (EUI) for VWs. Following the guidelines outlined by Aiken and West (1991), we mean-centered all values prior to creating the interaction terms to reduce collinearity. For the intermediate dependent variable UTR, we first entered disposition to trust (DTR) in the estimation equation and found it to have a significant relationship with UTR ($\beta = 0.50$, $p < 0.01$). In the next model, we entered the direct terms of the trust-building antecedents in the research model: situational normality (SIN), structural assurance (STA), and social presence (SOP). Both the trust-building antecedents from the institutional trust model—SIN ($\beta = 0.16$, $p < 0.05$) and STA ($\beta = 0.38$, $p < 0.01$)—as well as SOP ($\beta = 0.25$, $p < 0.01$) have significant effects on UTR, thereby supporting H1.

In the final model, we tested for the moderating effects of social presence (SOP) on the relationships between situational normality (SIN) and structural assurance (STA) and user trust in VWs (UTR). The results show that social presence positively moderates the relationship between situational normality and user trust ($\beta = 0.18$, $p < 0.05$), thereby supporting the moderation hypothesis H2. Further, social presence negatively moderates the relationship between structural assurance and user trust ($\beta = -0.16$, $p < 0.05$), thereby supporting the moderation hypothesis H3. Further, we observe that the explanatory power of the model (ΔR^2) is enhanced significantly by incorporating interaction terms.

Next, we assessed the structural relationships for the full model, where emergent use intention (EUI) is the dependent variable. Similar to the previous analysis, in the first model, we introduced the demographic control variables age, gender, IT professional orientation, and education. None of the demographic variables was significant. In the next model, we entered user trust. Consistent with previous research on trust in virtual environments, user trust has a strong direct relationship to EUI ($\beta = 0.66$, $p < 0.01$), thus supporting H4. Finally, the high value of explained variance in EUI ($R^2 = 0.44$) supported the model's comprehensiveness.

To better understand the pattern of interactions between the institutional trust-building factors (situational normality and structural assurance) and social presence for explaining user trust in VWs, we plotted the significant interactions, following Aiken and West's guidelines. From the interaction plot (Figure 3), we see a positive moderating influence of social presence on the relationship between situational normality and user trust. In fact, the relationship is significant only when there is a high level of social presence. We also performed a slope test and found that the slope for high social presence is significantly different from zero, whereas the slope for low social presence is not significantly different

[2]The representation of results using PLS is used in a way similar to prior studies such as Sykes (2015) and Sykes et al. (2009).

Table 1. Results: Structural Model: Predicting User Trust in VW and Emergent Use Intention

	User Trust in VW			Emergent Use Intention	
	Model 1	Model 2	Model 3	Model 4	Model 5
Control Variables	β	β	β	β	β
DTR	0.50**	0.16*	0.16*		
Age				0.02	0.02
Gender				0.02	0.02
IT Profession				0.00	0.00
Education				0.07	0.07
Independent Variables					
SIN		0.16*	0.14*		
STA		0.38**	0.42**		
SOP		0.25**	0.25**		
UTR					0.66**
Interaction Terms					
SOP × SIN			0.18*		
SOP × STA			-0.16*		
R^2	**0.25**	**0.59**	**0.61**	**0.03**	**0.44**
ΔR^2		**0.34****	**0.02***		**0.41****

n = 197, *p < 0.05, **p < 0.01

Key: UTR: User Trust, EUI: Emergent Use Intention, DTR: Disposition to Trust, SIN: Situational Normality, STA: Structural Assurance, SOP: Social Presence

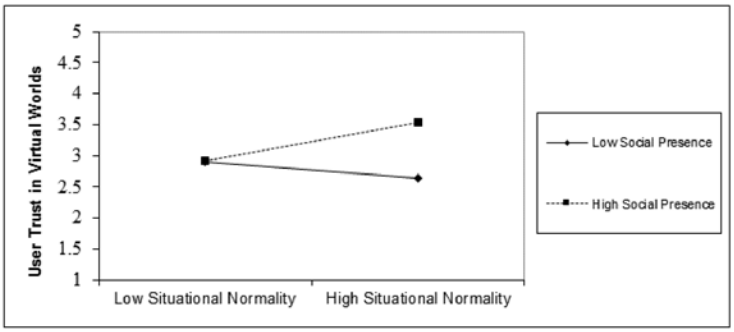

Figure 3. Interaction Plots for Moderating Relationships: User Trust in VWs: Low and High Situational Normality in conjunction with Low and High Social Presence

from zero; further, the two slopes are significantly different from each other. This highlights both the importance of a high level of social presence and the significant complementary nature of social presence.

In contrast, social presence negatively moderates the influence of structural assurance on user trust in VWs (Figure 4). When there is a high level of social presence, the relationship between structural assurance and user trust in VWs becomes weaker. We also performed a slope test and found it to be consistent with the result and the slopes for high and low social presence are significantly different from each other and that structural assurance influences user trust significantly less strongly in a scenario of high social presence. The interaction plot and the slope test clearly demonstrates the substitutive role of social presence for structural assurance in fostering user trust in VWs. Thus, social presence in VWs substitutes for the role of the formal structural assurance mechanisms in

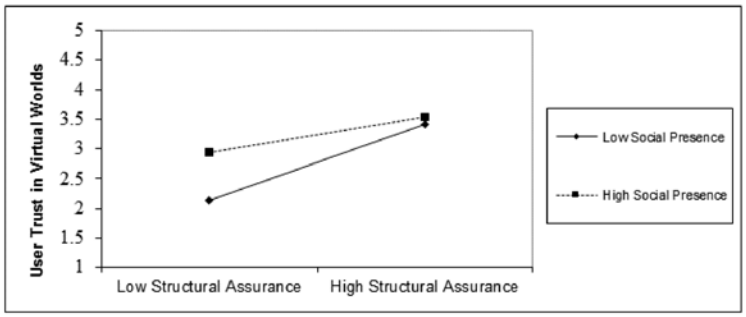

Figure 4. Interaction Plots for Moderating Relationships: User Trust in VWs: Low and High Structural Assurance in Conjunction with Low and High Social Presence

fostering user trust. But we also observe that in the plotted range, the combination of a high level of social presence and a high level of structural assurance is certainly better than high social presence and low structural assurance. Thus, the contextualized and augmented institutional trust model (Figure 2) is validated for the VW context.

Qualitative Method: Interview Design and Design Validity

Venkatesh et al. (2013) suggested three different types of validity relevant for qualitative research: *design validity, analytical validity*, and *inferential validity*. In the following sections, we perform these validity checks for our qualitative analysis in conjunction with results from the quantitative research.

Design validity concerns how well a qualitative study is designed and executed, so that the findings are credible and transferable (Venkatesh et al. 2013). The analysis and the interpretation must be accurate for understanding the thoughts, feelings, experiences, and intentions of the interview participants. In the present study, we ensured design validity by maintaining rigor in selecting the interview participants and giving them freedom to communicate their thoughts.

We contacted 90 active Second Life users through Second Life's official page on Facebook, requesting them to participate in the interview. We chose the respondents through the official Facebook page because it has over 200,000 fans. Second Life's monthly activity user base is about 1 million, which implies that roughly 20 percent of this user base is connected to Facebook (Au 2011b). This represents a good proportion of the active VW population. Prior to sending Second Life users our request to participate in the interview, we reviewed the sampled users' Facebook profiles. Upon confirming them as active VW users involved in work-related activities in VWs, we requested their participation in an interview by sending them personalized messages through Facebook. Appendix G presents the semistructured interview questions used in this study.

Of the 90 VW users contacted, 29 agreed to participate in an interview. The profiles of the interview participants are presented in Appendix H. Unlike the survey respondents, who were potential users of VWs for workplace collaborations, the interview participants were existing users of VWs for professional activities, such as VW developers, VW teachers, VW hosting providers, and VW content creators. Their responses, which came from a different perspective from that of the survey respondents, provide diversity in perspectives, and thus the findings from the qualitative study can be used to *corroborate* and *complement* the findings from the quantitative research, thereby providing completeness of understanding (Venkatesh et al. 2013; Venkatesh, Brown, and Sullivan 2016).

As some respondents were non-native English speakers, the interviews were conducted in-world (within the VW), mostly through text chat, so that spoken English and pronunciation were not barriers to communication. We also sent the participants a list of open-ended interview questions for which they could later e-mail more detailed responses to supplement the short text messages recorded in-world. However, a few respondents preferred to use voice chat in Second Life to give their responses to the open-ended questions. For these respondents, the interviews were audio recorded and later transcribed for analysis. All 29 respondents were heavy users of VWs, and 82.1 percent of the respondents had more than 2 years' experience working with them.

Of the various VWs, we specifically chose Second Life as our interview platform for three reasons. First, Second Life is one of the world's most popular VWs, with more than one million active users monthly (Au 2011a). Second, it has important economic implications. It is an independent socioeconomic system with its own residents, estates, currency, shopping malls, and schools. In July 2009 alone, there were 27,840,722 transactions and 67,056 users earned revenue through Second Life (Zhao et al. 2010), and even in current times there are about 900,000 VW users (Weinberger 2015). This clearly reveals that Second Life has many business applications and is much more than a mere gaming platform. Third, although Second Life is usually considered to be a social and business platform, it also continues to have several gaming elements (Messinger et al. 2009).

Qualitative Study: Analysis, Analytical Validity, and Inferences

Analytical validity is the theoretical validity or theoretical explanation of the credibility, plausibility, and trustworthiness of the data that can be used to defend the data if they are challenged (Venkatesh et al. 2013). We maintained analytical validity by ensuring that our application of methods and interpretation of data were rigorous, that our data collection was high quality, and that our data analysis and reporting were rigorous (Guba and Lincoln 2005; Ridenour and Newman 2008; Venkatesh et al. 2013).

After we collected and compiled the interview responses, we analyzed the qualitative data into general themes representing the core set of constructs under study. We manually coded patterns of similarities and differences with regard to EUI for VWs in collaborations. We used a multiple classification scheme so that each response could be classified into one or more categories (Bhattacherjee and Premkumar 2004). The coding was done independently by the two authors, with each response coded into one or more of the categories. The coding scheme was jointly derived based on the research questions and the constructs under study. The valence (positive or negative) for each category was also identified, and any off-quadrant or divergent responses were noted. After the initial coding and discussion, consensus coding was used to confirm codes and to match transcribed quotes with codes derived from the analysis. For illustrative purposes, Appendix I presents sample qualitative responses with initial and consensus coding. Based on this analysis, we found that the qualitative study supports all four of the hypotheses that we tested through quantitative analysis, as presented in the previous section. In the next section, we describe the inferences from the qualitative research in relation to the findings from the quantitative study.

Inferences: Corroboration and Confirmation

In this section, we use the *bridging* approach, which is the process of strengthening the findings from the quantitative study via the results from the qualitative study (Lewis and Grimes 1999; Venkatesh et al. 2013). As previously mentioned, the findings from the qualitative data supported all four hypotheses. In order to develop a consensus between the quantitative and qualitative findings, we situate the findings from the qualitative study within the results obtained from the quantitative study to delineate the corroborated meta-inferences.

Of the 29 interview respondents, 85 percent were positive regarding usage of a VW as a workplace collaboration tool, which supports the overall mean score of 4.22 in our quantitative study. One such respondent remarked:

> *I believe virtual worlds bring many* ***new possibilities for collaboration****,*[3] *especially for workshops and staff education, conferences, and seminars. For large companies with many overseas branches, it eventually will become a unique platform for communication between colleagues who work in distant places .... You can make presentations, organize meetings, use the audio-visual possibilities of the virtual worlds, and bring together teams from New York, London and Buenos Aires, without losing time for extensive meetings.* (M6)[4]

We also found out that consideration of the EUI concept was important for the VW context because VWs were indeed seen as a recreational tool that could possibly be used for workplace collaboration. As one interviewee remarked:

> *Virtual worlds were never intended to be a collaboration tool. They are places where people go to have fun. But virtual world serves as an* ***interesting alternative to hold meetings*** *for the staffs, which can both introduce work and play options together.* (F5)

Similar to the quantitative study, user trust in VWs emerged as one of the prime challenges for using them as workplace collaboration tools. For example, three respondents commented:

> *There are people who say that virtual world is trustworthy, but there may be* ***chances that our data***

[3]All boldfacing has been done by the authors to emphasize relevant portions from the interview quotes.

[4]Respondent code here and elsewhere as indicated in Appendix H.

> ***is getting stolen and someone may be monitoring us****, leading to other complications.* (M12)

> *The* ***main risk has to do with the security****; everything else can be overcome.* (M15)

> *I am always acutely aware that connecting across the Internet is a* ***security risk****. I advise all partners to be aware of the implications of the lost intellectual property.* (M9)

These responses validate our choice of user trust as a salient factor in developing EUI for VWs in workplace collaborations. Further, our qualitative results establish the salience of *social presence* for fostering user trust in VWs. Commenting on this issue, three interviewees remarked:

> *Presenting products physically and the* ***3-D presence of the participants****, giving an immersive sensation and the feeling that they are there,* ***develops trust****.* (F7)

> *Definitely,* ***I trust virtual worlds*** *and use it for serious workplace tasks like collaborations. As everybody,* ***I feel the close encounters****, seeing each other's avatars, communicating using private messages or open chat, even hearing voices of colleagues, since many virtual worlds applied voice chat to their platforms. Everything is serious—you are virtually sitting on a chair around a table or in a hall, seeing the presentation screen,* ***feeling the presence of your colleagues****, discussing things related to work.* (M6)

> *Humans are very visual beings. This is an argument why I prefer to interact with other people via virtual worlds than on a phone call or e-mail, where I have absolutely no visual references.* ***Visual stimulation is very important*** *for us humans.* (F8)

Our analysis of the interview responses thus supports the quantitative empirical finding that social presence fosters user trust in VWs. Next, we see that the qualitative responses can also be used to make inferences about the moderating role of social presence for the relationships of situational normality and structural assurance to user trust in VWs. Commenting on the role of social presence in complementing user perceptions of *situational normality* and further fostering user trust, one respondent remarked:

> *The notion of others being socially present in VW helps me develop real relationship with the person. The* ***heightened sense of comfortable presence*** *adds immeasurably to* ***building trust in a relationship****. Avatars that are humanoid perhaps help some individuals feel the VW is more normal. The* ***presence of avatars definitely increases sense of normalcy****. It may increase sense of trustworthiness for some individuals that base trust upon appearance.* (F12)

Our results also suggest that social presence becomes a dominant factor, equal to and potentially overshadowing (or substituting for) the role of structural assurance for fostering trust in VWs. As one interviewee commented:

> ***In VWs, a person is more realistic*** *and it's easier to communicate. Therefore,* ***more trust in the VWs****.* (M7)

Another interviewee commented:

> *VWs help me develop a real relationship with a person. In VWs, we have* ***more opportunities to express ourselves*** *than in other forms of nonphysical communication, through speaking and typed chat. It is also a* ***safe environment****, physically and emotionally especially in worlds where we can choose to be anonymous. All these factors lead to personal safety* ***which adds to build trust*** *in a relationship.* (F12)

Thus, we observe that the results from the qualitative study not only validate the choice of constructs for the quantitative study, but also point toward similar results, thereby corroborating and confirming the validity of inferences obtained from the quantitative survey analysis (Venkatesh, Brown, and Sullivan 2016). Given that our quantitative and qualitative data are from different set of participants and different data-collection procedures, the findings' similarity indicates we used a strong theoretical foundation for our research (Venkatesh, Brown, and Sullivan et al. 2016). The results' richness and robustness gives us confidence about the strong role of social presence in influencing user trust for VW collaborations. The quantitative study helped us empirically examine the theoretical model, which was further confirmed by the qualitative study.

Meta-Inferences: Integrating Quantitative and Qualitative Inferences

Previous studies have recommended the use of a mixed methods approach not only for testing the robustness of the results obtained from the first study (confirmation and corroboration), but also for uncovering richer insights (complementarity) than would be found with a single method alone (Jick

1979; Karahanna et al. 1999; Lee 1991; Venkatesh et al. 2013). Accordingly, the qualitative study is used to confirm and complement the findings from the quantitative study (Goel and Prokopec 2009). To develop meta-inferences by integrating the findings from the quantitative and qualitative research, in addition to bridging (described in the previous section), we followed the *bracketing* approach, which is the process of including all diverse and opposing views about the phenomenon of interest to delineate the mysteries and surprises in the findings (Lewis and Grimes 1999; Venkatesh et al. 2013).

Meta-Inferences: Complementarity

A qualitative method provides an opportunity to delve more deeply into a phenomenon of interest. In addition to corroborating the results from our quantitative study, we use the findings from our qualitative interview analysis to gain complementary insights from a divergent set of respondents. Specifically, we use *bracketing* to gain additional complementary insights with a view to identifying boundary conditions (limits) for the quantitatively tested theoretical model. The five boundary conditions that emerged in the context of the augmented institutional trust model for EUI of VWs are:

- **Boundary Condition #1: Organizational Willingness to Try Virtual Worlds**: Although this research identifies user trust as one of the prime factors that facilitate individuals' EUI, the constraining factor in most cases is the organization's willingness to try VWs as an option for collaboration. This may require open-mindedness and some appetite for risk on the part of the organization. The roles of the identified factors are significant only when the organization is willing to try VW technology for workplace collaboration in the first place. As one of the interviewees remarked:

> *I believe that **once you start** using 3-D Web in your organization, some of the people are going to become natural at it and they're going to love building in 3-D and being avatars and changing clothing, making buildings, and so forth—so somebody who's already creative and gets into 3-D Web is always going to start thinking of ways to develop it for meetings and collaboration.* (M10)

- **Boundary Condition #2: Understanding the Learning Curve**: Although VWs offer an efficient platform for collaboration, it is necessary to recognize that those who intend to use VWs will generally have a steep learning curve for mastering their use as a workplace collaboration tool. Before drawing conclusions about their success or failure in using VWs to support collaborative efforts, organizations need to take into account the time that must be invested to gain the necessary experience that makes VW usage comfortable. As one interviewee commented:

> *VWs have a **tough learning curve**—it takes time to learn and become fluent with the browser, in particular, the camera controls. The default point of view is always behind your head, and one of the hardest things to teach someone new is how I look at my own face—there're no mirrors, you have to learn to use the camera.* (M10)

- **Boundary Condition #3: Devising a Multiple-Tool Collaboration Strategy**: VWs do enhance trust, because the inherent social presence increases the perception of situational normality. Yet during the interviews, it emerged that for effective collaboration, VWs should be used as one of many collaboration tools, as they provide additional cues not addressed by other media. Commenting on the use of multiple tools to enhance social presence, one of the interviewees remarked:

> *No matter how persons represent themselves—live or online—they are the same persons. What happens is that in **using new and different media**, and especially using 3-D Web, they can express aspects of their personality that aren't usually expressed in other ways. Now I find when there are more ways to interact with others—live, phone, e-mail, skype, 3-D Web—the richer and more real they became to me.* (M10)

- **Boundary Condition #4: Formulating Laws and Regulations Related to Virtual Worlds**: The inferences from the quantitative and qualitative analyses suggest that social presence attenuates the role of structural assurance in developing user trust. However, there are certain policy issues that require attention but cannot be addressed merely by the enhanced social presence of VW users. One such challenge pointed out by an interviewee is the need for policies that provide proper legal frameworks governing VWs:

> *One of the top uncertainties is changes of policy by host companies, like Linden, as well as sudden disappearance of smaller OpenSimulator grids. **Proper laws should be established** in such VWs to assure the users that they are protected.* (F11)

- **Boundary Condition #5: Identifying Contexts Where VWs are Useful for Collaboration**: VWs no doubt offer an efficient medium for collaboration, but they should be used only in those contexts where they offer more value than conventional collaboration tools. Hence, it is important to identify the organizational contexts for which VWs should be utilized. From the interview responses, VWs certainly do not appear to provide an answer for all collaborative contexts:

> *The acceptance is mainly based on the **area of application where virtual worlds offer additional value** compared to other ways of communication.* (F10)

> *It's interesting to develop and experience 3-D content collaboratively, but I'm not sure **people will see any value in using 3-D spaces to share 2-D content** such as PowerPoint presentations.* (M4)

Robustness Tests for the Contextualized Institutional Trust Model

The meta-inferences described in the previous sections not only *confirm* the findings from the quantitative study, but also *augment* them by identifying five boundary conditions through the qualitative study. Further, as described in the following subsections, the data analysis from the qualitative study indicates the salient role of *individual* and *technology* characteristics in the VW context that need to be suitably incorporated into the enhanced institutional trust model for the VW context (Figure 2).

Individual User Characteristics

Nearly 80 percent of the interviewees highlighted the need to focus on individual user characteristics for ascertaining trust and EUI in VWs. For example, one respondent remarked:

> *I think the acceptance of virtual worlds in general depends **mostly on the people** using them and not on the intrinsic characteristics of virtual worlds by themselves.* (F8)

Situating the analysis of interview transcripts within the IT adoption literature, we concluded the salient role of at least two individual user characteristics, namely self-efficacy and playfulness in the context of VWs (Kohler et al. 2011; Wasko et al. 2011; Wells et al. 2011). Self-efficacy refers to individuals' beliefs about their ability and motivation to perform certain tasks (Bandura 1977). In the present context, self-efficacy describes the knowledge and skills that individuals have for using VWs, despite the attendant risks and uncertainties. Highlighting the salience of self-efficacy in the present research context, one interviewee commented:

> *My **ability and expertise will help me develop** intentions to use VWs because I know what the risks are ahead of time and how to mitigate them.* (M10)

Similarly, describing the role of self-efficacy in developing user trust for EUI, two other respondents commented:

> *People **who are used to using technology will trust** it and use it as just another tool.* (F7)

> ***Ability to use** the technology is what counts.* (F10)

Playfulness refers to an individual's tendency to interact spontaneously, inventively, and imaginatively with the focal technology (Ahn et al. 2007). Regarding the present research, individual playfulness is the spontaneity and joy users feel while using VWs (see Webster and Martocchio 1992). The individual characteristic of playfulness drives individuals to use environments such as VWs without anticipating the consequences of associated uncertainties and risks, especially in recreational settings. Underscoring the salience of playfulness, one interviewee remarked:

> *Creativity and **playfulness** are what got me into the business in the first place.* (F11)

Technology Use Characteristics

Another significant factor that emerged through the interviews and was supported by more than 90 percent of the respondents was the *usefulness* and *ease of use* of VWs as drivers of trust and EUI for utilizing VWs as a collaborative tool. Usefulness and ease of use are the classic technology use characteristics described in IT adoption models (Venkatesh 2000; Venkatesh and Bala 2008; Venkatesh and Davis 2000; Venkatesh et al. 2003). Commenting on the salience of the usefulness of VWs, one of the interviewees remarked:

> *I like VWs for teaching and research since it **offers freedom to create and innovate.*** (M2)

Yet another interviewee commented:

> *I think VWs are more and more a tool for workplace collaboration because VWs bring a **lot of advantages like** presenting products physically, the 3-D presence of the participants, low cost and sparing traveling expenses.* (F7)

In a similar vein, respondents also found ease of use to be a salient factor in the VW context. For example, two other interviewees commenting on VWs' ease of use stated:

> *You trust VWs to use it for serious workplace collaborations because VWs are* ***easy to manage and you can control*** *all the parameters before organizing meetings or workshops.* (M6)

> *In VWs, the person is more realistic and it's* ***easier to communicate.*** (M7)

Based on the findings from the qualitative study, it was imperative for us to further augment the theorized VW institutional trust model by suitably incorporating individual user characteristics and technology use characteristics. During the initial quantitative study phase, based on prior literature on the subject, we had collected data on a number of additional variables including several user characteristics and technology use characteristics variables. To check for the robustness of the initially theorized model (Figure 2), we tested two additional models in a *post hoc* quantitative analysis; in these models we controlled UTR (user trust) and EUI (emergent use intention) with the two identified individual user (self-efficacy and playfulness) and the two technology use (usefulness and ease of use) characteristics. As can be seen in Appendixes J and K, the results for the two models clearly show the strong direct and moderating effects of social presence even after adding the individual user and technology use characteristics (identified during qualitative analysis) as control variables for UTR and EUI, respectively. This further confirms the robustness of our proposed theoretical model and establishes the important direct and moderating roles of social presence in developing user trust for EUI to utilize VWs as a workplace collaboration tool.

Discussion

Taking a holistic approach, the present study is one of the first that uses URT to theorize and test the moderating influence of social presence in fostering user trust and EUI for VWs in workplace collaborations. In addition to proposing a trust-theoretic nomological network for workplace usage of VWs, the study has several implications for research and practice.

Implications for Research

First, by leveraging the guidelines for context-specific theorizing proposed by Hong et al. (2014), we extend McKnight et al.'s (2002) institutional trust model to the specific context of VWs. While McKnight et al.'s online trust model has already been established and tested in the context of e-commerce—where *situational normality* and *structural assurance* are significantly related to user trust—we extend McKnight et al.'s model to the specific context of VWs by taking into account the imbued contextual socialness. Grounding our arguments in uncertainty reduction theory (URT), we explain the mechanisms through which user trust in VWs can be fostered by reducing the prevailing uncertainties. Specifically, we theorize the contextualized direct and moderating effects of *social presence* in complementing and substituting, respectively, for the relationships of situational normality and structural assurance to user trust in VWs. The extended model of institutional trust (Figure 2) contributes to the literature on online trust by incorporating elements of "socialness" that are specific to VWs. However, in addition to VWs, the model can be useful for examining other new technological media and platforms with greater socialness than traditional communication tools such as e-mails and chats.

Second, we bring in URT, a theory from communications research, to the IS literature, and in doing so we bring a fresh perspective on why situational normality and structural assurance build trust. This study leverages the basic human need to reduce uncertainty to explain approaches to building trust. The computer-mediated VW context has significant uncertainties, making URT particularly well-suited for examination of VWs. Situating our arguments within the broad framework of URT, we theorize how the three key risk mitigation strategies—active (situational normality), passive (structural assurance), and interactive (social presence)—foster user trust in VWs. This research along with a few recent studies, such as Venkatesh, Thong, Chan, and Hu (2016), demonstrates the utility of URT for answering IS-related questions, thereby extending its range of application beyond the current domain of communications-related research. Future research can further leverage URT for theorizing in other IS contexts.

Third, using a URT perspective, we highlight the importance of examining emergent use intention (EUI) for VWs in workplace collaborations, thereby moving beyond their present dominant use in game/entertainment-based applications. Although previous literature has extensively examined adoption and continued usage intention for several technologies in different contexts (e.g., Bhattacherjee 2001; Venkatesh 2006; Venkatesh and Davis 2000), this study is one of the first to examine EUI for VWs in workplace collaborations. Thus, we contribute to the ongoing deliberations concerning technology acceptance and continuance by highlighting the need to examine EUI for existing technologies, which can potentially open new uses for these technologies. As digital convergence is inevitable, resulting in new services and new demands in the market, convergent services (such as Voice over IP,

Mobile TV, and Smart TV) tend to disrupt the market by replacing older technologies, and the concept of EUI as discussed in the paper provides a useful backdrop for analyzing the effectiveness of emerging technologies. As modes of communication and information are continually reforming to adapt to the enduring demands of technologies, it will be interesting to continue examining of how useful technology usage can be translated from one context to another.

Fourth, through a careful application the framework for a mixed methods research approach (Venkatesh et al. 2013; Venkatesh, Brown, and Sullivan 2016), we demonstrate how following a sequential mixed methods approach—a quantitative survey integrated with a qualitative study—can help in arriving at rich and meaningful inferences and meta-inferences. Specifically, through bridging, we corroborate and confirm the inferences from our quantitative research by situating them within the findings from the qualitative analysis. Further, through bracketing, we complement the findings from the quantitative survey with contradictions from the deeper qualitative analysis that point to five boundary conditions restricting the conclusions of the quantitative study. The identified boundary conditions help in forming a holistic understanding of the phenomenon that can be used to build a substantive theory of user trust and EUI for workplace collaboration in VWs. The qualitative study also unearths the significant roles that individual user characteristics and technology characteristics can play in fostering user trust and EUI. To be confident about the validity of the contextualized VW institutional trust model (Figure 2), we controlled EUI for these characteristics in the subsequent *post hoc* analysis. The proposed direct and moderating effects of social presence remained significant in the *post hoc* analysis (even after controlling for the individual and technological characteristics), highlighting the robustness of the theorized institutional trust model. This derived substantive model can be used as a point of departure for future research that aims to extend the usage of other related technologies from their present tasks to new and emerging applications.

Finally, we contribute to the VW literature that aims to understand the modalities through which VWs might be utilized for workplace collaborations (Schmeil et al. 2012; Venkatesh and Windeler 2012). The study not only identifies the imperative of reducing uncertainties for fostering user trust and EUI, but also provides a nuanced understanding of the key role that social presence plays in the VW context, in addition to the roles of situational normality and structural assurance. This finding is important to better understand the usage of other new technologies that have a high degree of social presence or tools through which social presence can be injected in the usage context. Further, by extending the literature on VWs, this study should deepen future researchers' interest in understanding the management of VWs and other similar technologies as collaborative tools.

Limitations and Future Directions

This study has a few limitations that should be noted. First, the data were self-reported and thus may be subject to the respondents' memory limitations and varying patterns of scale use while answering the questions. The self-reported data might also be biased by social desirability. However, we controlled for potential response bias by designing and administering the survey without making the research hypothesis known to the respondents (Cook et al. 1970). Moreover, the social desirability bias was controlled by clearly specifying the voluntary nature of the survey and administering the survey individually to respondents (Nederhof 1985). Second, although this research has explored the salient role of social presence in establishing user trust and developing EUI for VW collaborations in the workplace, additional variables can be explained from other theoretical perspectives. For example, many extrinsic factors that may be important for VW use, such as cost, organizational requirements, top management championship, and interface design, can be examined by future research. Third, although we have augmented the institutional trust model by identifying five boundary conditions from our qualitative results, we have not examined these boundary conditions. This could be an interesting avenue for future research. Fourth, our research model was tested using cross-sectional data; that is, perceptions and intentions were measured at a single point in time. However, perceptions change with time and the experience of users (Bhattacherjee 2001). Although we tested for the common method bias and also used a mixed methods approach to confirm and corroborate the empirical results, a future longitudinal or experimental study can help complement and extend our findings.

Implications for Practice

This study also has several managerial implications. First, despite the high collaborative potential that VWs offer, their use by organizations for workplace collaboration is largely sporadic and unsuccessful. From an organizational perspective, it is important to understand the ways in which this new low-cost collaborative media can be effectively employed for workplace collaborations. Prior research has identified the uncertainties that are inherent in VWs as the key reason precluding the possibility of their extensive utilization for workplace collaborations. Our study not only highlights the importance of mitigating prevailing uncertainties in VWs for establishing user trust, thereby facilitating EUI, but also delineates trust-building mechanisms in VWs that can be

useful for organizations that are attempting to understand and implement operations in VWs.

Second, this study establishes the salience of social presence in the development of user trust in VWs and incorporates it in the contextualized institutional trust model for VWs. Although social presence is not a salient variable for the development of online user trust in the context of e-commerce, it plays a significant role in the VW context. Specifically, in addition to its direct relationship with user trust, social presence can enhance or attenuate the effects of the other institution-based trust-building antecedents—situational normality and structural assurance—on user trust. This contextualized salience of socialness in VWs indicates that practitioners should consider social-presence-building features in VWs for fostering user trust and facilitating the utilization of VWs in workplace applications.

Third, by using a qualitative method in conjunction with a quantitative method, the study not only corroborates the quantitative inferences through triangulation, but also identifies contradictions between the results obtained from the two methods. These contradictions provide complementary insights and are helpful for identifying the boundary conditions and thus limiting the applicability of the results from the quantitative study. To successfully utilize VWs for workplace collaborations in organizations, managers not only need to look at the facilitating conditions (Figure 2), but also need to carefully assess and address the boundary conditions limiting such implementations. The identified boundary conditions that may limit the use of VWs for workplace collaborations in organizations include organizational willingness to try using VWs, understanding the learning curve, devising a multiple-tool collaboration strategy, formulating laws and regulations relating to VWs, and identifying the contexts where VWs will be useful for collaboration. These conditions need to be appropriately considered along with the uncertainty reduction mechanisms to facilitate effective utilization of VWs for workplace collaborations. Together, the results provide practitioners with important guidelines for facilitating VW usage in workplace collaborations.

Conclusions

Despite the immense collaborative potential offered by VW technology, workplace utilization of VWs is rather limited. Several firms that have attempted to use VWs have only been marginally successful, primarily due to the prevailing uncertainties in the VW environment. Therefore, anchored in an uncertainty reduction perspective, we sought to augment and extend McKnight et al.'s (2002) institutional trust model by contextualizing it to the VW context. Grounding our arguments in URT, we proposed and tested the direct and moderating roles of social presence in influencing user trust in VWs. Specifically, we delineated the complementary and substitutive influences of social presence on the relationships of the institutional-trust-building antecedents of situational normality and structural assurance to user trust in VWs, thus contributing to the extant theory on online institutional trust. Further, by carefully applying the recently proposed mixed-methods research framework (Venkatesh et al. 2013; Venkatesh, Brown, and Sullivan 2016), we corroborated and complemented the findings from the quantitative analysis with results from the qualitative study to delineate rich and robust inferences and meta-inferences. This synthesized methodological approach is useful for building a substantive theory of user trust and EUI for the VW context that can help organizations better understand and leverage VWs for workplace collaboration. Finally, this study informs future research on new collaborative technologies imbued with elements of socialness.

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About the Authors

Shirish C. Srivastava is a professor at HEC, Paris. Previously he lectured at the National University of Singapore. His research interests include e-government, offshore sourcing, emerging technologies and technology enabled innovation. Shirish's research has been published in several international refereed journals such as *MIS Quarterly, Journal of Management Information Systems, Journal of the Association for Information Systems, European Journal of Information Systems, Information Systems Journal, Journal of Information Technology, MIS Quarterly Executive, Communications of the AIS,* and *Journal of Global Information,* among others. He currently serves on the editorial board of several journals such as *IEEE Transactions on Engineering Management, European Journal of Information Systems,* and *Journal of the Association for Information Systems.* Shirish has been nominated for the prestigious Carolyn Dexter Award at the Academy of Management (AOM) Meetings in 2005, 2007, and 2008, and was a finalist for the award at AOM 2007. He was nominated for the academy-wide William H. Newman award at the AOM 2009, Chicago, and is the winner of the Gerardine DeSanctis Dissertation Award for the best doctoral dissertation paper in organizational communication and information systems. He was again nominated for the William H. Newman award at AOM 2012, Boston, by the international management division. He received of the Prix Académique de la Recherche en Management, Paris, France in 2013, 2015, and 2016.

Shalini Chandra is an assistant professor at the S. P. Jain School of Global Management, Singapore. Her research interests include adoption and acceptance of emerging technologies, virtual worlds, mobile payment, trust, and the dark side of technology. Prior to joining the Jain School, she worked as a research fellow at Nanyang Technological University Singapore. Shalini holds a Ph.D. from the same university. Her research has been published in several international refereed journals such as *Information Systems Journal*, *Journal of the Association for Information Systems,* and *Communications of the Association for Information Systems*, among others. She has also presented her work at several top-tier conferences in the area of information systems and management such as International Conference on Information Systems, Academy of Management, Pacific Asia Conference on Information Systems, and Americas Conference on Information Systems, and also at top-tier communication conferences such as International Communication Association.

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RESEARCH ARTICLE

SOCIAL PRESENCE IN VIRTUAL WORLD COLLABORATION: AN UNCERTAINTY REDUCTION PERSPECTIVE USING A MIXED METHODS APPROACH

Shirish C. Srivastava
Information Systems & Operations Management Department, HEC Paris, 1 Rue de la Libération,
Jouy en Jousas Cedex, 78351, FRANCE {srivastava@hec.fr}

Shalini Chandra
S P Jain School of Global Management, 10 Hyderabad Road,
Singapore 119579 SINGAPORE {shalini.chandra@spjain.org}

Appendix A

Key Research on Virtual Worlds

Author	Methodology/Sample	Results
Animesh et al. (2011)	Survey of 354 residents of Second Life.	The results show the manner in which technological (interactivity and sociability) and spatial (density and stability) environments in VWs influence participants' virtual experiences (telepresence, social presence, and flow), which subsequently affect their response (intention to purchase virtual goods).
Berente et al. (2011)	Analysis of the written assessments of 59 business professionals who spent an extended period of time in Second Life.	The results show 12 common patterns of sense making for organizational value of VWs and indicate that themes of confirmation, open-ended rhetoric, demographics, and control are evident in the different types of claims that were addressed.
Cagnina and Poian (2009)	Qualitative methodology to sketch a radar map framework to identify value drivers and their subsequent impact on elements of value proposition.	This paper creates an analytical framework for understanding the conditions under which business models that hinge on VWs may find new sources of value.
Chandra et al. (2012)	Empirical study to test a model proposing reduction of perceived cognitive burden and minimization of risk as the two key motivations for adaptive use intention.	The results identify cognitive absorption and user trust in VWs as the mechanisms leading to the individual-level adaptive use decision.
Chaturvedi et al. (2011)	Reviews the characteristics of agent-based VWs to discern design requirements. A set of design principles are derived from the review.	This paper examines the design, development, validation, and use of VWs. Results are used to propose extended design principles.

Author	Methodology/Sample	Results
Chen et al. (2010)	Survey of online gaming participants.	The results suggest that Multimedia Realism for Social Interaction (MRSI) is related to dependency among players of Massively Multiplayer Online Games (MMOG). Further, MRSI is positively related to a sense of diversion, a positive aesthetic experience, and a sense of virtual community, as suggested by the theory of uses and gratifications.
Chesney et al. (2009)	Series of observations and focus groups with users.	The results show that negative behavior, or "griefing," is common in VWs. It is typically targeted at inexperienced residents by those with more knowledge about the VW.
Davis et al. (2009)	Proposes a conceptual model for research. The authors present an in-depth characterization of metaverse technology capabilities from a socio-technical perspective.	This paper aims to enhance research and practice in virtual teams in the context of metaverses through the development of a conceptual model that can be used to generate propositions and hypotheses across a range of key concepts.
Eschenbrenner et al. (2008)	Literature review.	This review presents VW capabilities, experiences, and factors associated with educational opportunities, as well as gaps in meeting pedagogical objectives.
Franceschi et al. (2009)	Experiment with voluntary participation of students to choose between a virtual or traditional learning experience.	The results show that 3-D VW environments provide a strong sense of group presence, which leads to engaging group-learning interactions.
Goel et al. (2011)	Quasi-experiment conducted within Second Life in a physical lab in which subjects had access to the same version of Second Life.	The results show that users' intentions to return to a VW are determined by a state of deep involvement (termed *cognitive absorption*) that users experience as they perform an activity and tend to lose track of time.
Goh and Wasko (2012)	Longitudinal study on the massively multiplayer online game EverQuest.	The results suggest that the leader–member relationship impacts members' allocation and development of resources, and that it is not only the quantity of members' resources, but also the type of member resources, that has a direct influence on performance. In addition, the results indicate that the influence of the leader–member relationship on member performance is fully mediated by the allocation and development of resources.
Greenhill and Fletcher (2013)	Structured ethnographic-style methodology to explore the daily working life found in virtual game environments.	Findings from empirical studies of the Puzzle Pirates and Farmville VWs explore emancipatory claims regarding labor practices in ICT-enabled work.
Junglas et al. (2013)	Laboratory controlled survey.	The results suggest that IS technology acceptance and adoption models should incorporate sociability of individuals along with usefulness and ease of use in order to predict their usage intentions.
Kohler et al. (2011)	Twenty-month action research project to study the experience of users and identify design principles for virtual co-creation systems.	The project created, deployed, evaluated, and improved a virtual co-creation system called the *Ideation Quest* as a model for designing co-creation systems in the VW context.
Mennecke and Triplett (2011)	Theoretical paper built on the analysis of reflection data from Second Life users.	The results suggest that users experience a greater sense of engagement, arousal, and task performance when they experience embodied social presence.
Montoya et al. (2011)	Controlled experiment consisting of 39 virtual teams of 91 individuals.	The findings provide a deep understanding of how the unique spatial and visual characteristics of VWs influence the collaborative behaviors and performance of virtual teams.

Author	Methodology/Sample	Results
Nah et al. (2010)	Survey approach in which subjects filled out a questionnaire before and after they experienced a 3-D VW branding site.	The findings suggest that the balance of skills and challenges in 3-D VWs influences users' flow experience, which in turn influences brand equity, and brand equity then increases the behavioral intention.
Nah et al. (2011)	Experimental design to compare 2-D and 3-D VWs. Total of 445 subjects, with 271 subjects assigned to 3-D version and 174 to 2-D version of a VW tour.	The findings suggest that, compared to a 2-D environment, a 3-D VW environment produces both positive and negative effects on brand equity.
Nardon and Aten (2012)	Qualitative study conducted in an organization that was in the process of adopting VWs to explore how individuals' interpretations of VWs influence their judgments about their value.	The results demonstrate that individuals' assessment of a technology varies with their interpretations and categorizations of the technology. The three categories for assessing the value of VWs in this study were: VW as a medium, VW as a place, and VW as an extension of reality.
Putzke et al. (2010)	Survey of all players of MMOGs over a six-month period.	The results indicate that structural effects and demographic variables active in the real world influence the evolution of players' interaction networks in MMOGs.
Roquilly (2011)	Analysis of contractual documents from a sample of 20 VWs, providing evidence of general trends and emphasizing differences between the VWs in terms of the business and gaming models sought by each game company.	The results show that game companies make use of copyright, codes, creativity, and community for control and development of VWs. They use the contract as a complementary component to reinforce their control over the four basic components in the "5Cs model" and to compensate for lacunae they may present.
Schmeil et al. (2012)	Proposes an avatar-based collaboration (ABC) framework to investigate collaboration patterns in VWs. Along with the framework, a case study of its first application in a global collaborative learning project is presented.	The case study illustrates how rich collaboration and collaborative learning experiences are created for VWs with the ABC framework.
Schultze and Orlikowski (2010)	Research commentary.	The commentary proposes that a performative perspective is useful for understanding the emergent aspects of VWs and their implications for organizations.
Suh et al. (2011)	Conceptual framework based on dual congruity perspectives (self-congruity and functional congruity) to examine how an avatar that resembles the user as much as possible affects usage and usefulness.	The results show that the greater an avatar's resemblance to its user, the more likely the user will have positive attitudes (e.g., affection, connection, and passion) toward the avatar, and the greater the user's ability to evaluate the quality and performance of apparel products will be.
Venkatesh and Windeler (2012)	Year-long comparative field study of two teams, one using traditional collaboration technologies, the other using a VW.	The results show that the use of VWs positively influences the relationship between technology use and team cohesion, which in turn predicts team performance. Also, agreeableness, conscientiousness, extraversion, openness, and computer self-efficacy interact with time and type of technology to positively influence team technology use.
Zhao et al. (2010)	Online survey of Second Life users.	The authors conceptualize the closeness of a human–avatar relationship as composed of interaction frequency, activity diversity, and relational influence, and identify its antecedents as perceived needs fulfillment, relationship irreplaceability, and resource investment.

Appendix B

Measurement Items for Principal Constructs

Emergent Use Intention (Based on Davis 1989; Davis et al. 1989; Venkatesh and Davis 2000), Cronbach's Alpha = 0.92
Given a chance, I intend to use the virtual world for collaborative tasks in my workplace in the future.
Given a chance, I predict that I will frequently use virtual world in the future for collaborative tasks in my workplace.
I will strongly recommend others in my workplace to use virtual world for collaborative tasks.
I foresee the use of virtual worlds for collaboration and information sharing in my workplace in the near future.
User Trust in Virtual Worlds (Gefen 2000; Jarvenpaa et al. 2000; Lee and Turban 2001; Pavlou and Gefen 2004; Pavlou 2003; Teo and Liu 2006), Cronbach's Alpha = 0.95
I trust virtual world to be reliable.
I believe the virtual world to be trustworthy.
I trust the virtual world.
Social presence (Gefen and Straub 2004), Cronbach's Alpha = 0.94
I believe there is a sense of human contact in using virtual world for interactions.
I believe there is a sense of personalness in using virtual world for interactions.
I believe there is a sense of human warmth in using virtual world for interactions.
Structural assurance (McKnight et al. 2002), Cronbach's Alpha = 0.91
I believe virtual world has enough safeguards to make me feel comfortable using it for collaboration.
I feel assured that legal and technological structures adequately protect me from problems on the virtual world.
I feel confident that encryption and other technological advances on the virtual world make it safe for me to collaborate.
Situational Normality (Gefen 2000; McKnight et al. 2002), Cronbach's Alpha = 0.87
I believe virtual world members understand other members they are working with.
I believe members in virtual world make promises that are reliable.
I believe members in virtual world have good intentions towards me.
Disposition to Trust (Gefen 2000), Cronbach's Alpha = 0.89
I generally trust other people.
I generally count on other people.
I generally have faith in humanity.
Playfulness (Agarwal and Karahanna 2000), Cronbach's Alpha = 0.94
When using the virtual world I perceive to be spontaneous.
When using the virtual world I perceive to be flexible.
When using the virtual world I perceive to be creative.
When using the virtual world I perceive to be playful.
Self-Efficacy (Compeau and Higgins 1995), Cronbach's Alpha = 0.76
I believe that I can use virtual world for collaborative tasks even if there is no one around to tell me what to do as I go.
I believe that I can use virtual world for collaborative tasks if I have a lot of time to carry out the task for which virtual worlds are provided.
I believe that I can use virtual world for collaborative tasks if I have the built-in help facility for assistance.

Perceived Usefulness (Davis 1989), Cronbach's Alpha = 0.96
Using virtual worlds would enable me to accomplish collaboration tasks more quickly.
Using virtual worlds for collaboration tasks would improve my performance.
Using virtual worlds for collaboration tasks would enhance my effectiveness.
Using virtual worlds for collaboration tasks would make it easier for me to carry out collaborative tasks.
Overall, I find that virtual worlds are useful for collaboration and sharing of ideas.
Perceived Ease of Use (Davis 1989), Cronbach's Alpha = 0.93
Learning to use virtual worlds would be easy for me.
It would be easy to get virtual worlds to do what I want it to do.
My interaction with virtual worlds would be clear and understandable.
It would be easy for me to become skillful at using virtual worlds.
Overall, I find virtual worlds easy to use.

Appendix C

Demographic Profile of Respondents

Demographic Variable	Category	Frequency (*N* = 197)	Percent
Gender	Male	84	42.6
	Female	113	57.4
Age	21 to less than 30 yrs	113	57.3
	30 to less than 40 yrs	72	36.6
	40 yrs and older	12	6.1
Education Level	Undergraduate	51	25.9
	Graduate	146	74.1
IT Professional	Yes	28	14.2
	No	169	85.8
Preferred VW	Second Life	155	78.7
	Other	42	21.3

Appendix D

Factor Loadings

	EUI	UTR	PLY	SEF	DTR	PU	PEOU	SOP	SIN	STA
EUI1	.62	.13	.31	.24	.08	.35	.30	.06	-.03	.22
EUI2	.63	.24	.18	.09	.07	.38	.26	.06	.12	.34
EUI3	.63	.29	.25	.20	.14	.27	.18	.23	.13	.22
EUI4	.69	.07	.14	.09	.21	.35	.16	.27	.16	.15
UTR1	.12	.72	.16	.11	.22	.31	.11	.22	.32	.18
UTR3	.19	.77	.13	.08	.20	.26	.16	.22	.23	.28
UTR4	.21	.72	.12	.17	.22	.26	.18	.24	.08	.31
PLY1	.13	.10	.79	.06	.10	.19	.28	.05	.14	.11
PLY2	.15	.04	.85	.03	.18	.08	.19	.10	.27	.04
PLY3	.14	.06	.87	.03	.14	.11	.16	.09	.16	.06
PLY4	.06	.12	.85	.14	.10	.10	.29	.16	.04	.08
SEF1	.21	.10	.19	.63	-.10	.17	.35	.11	.22	.10
SEF2	.04	.13	.17	.68	.19	.28	.03	.27	.12	-.06
SEF3	.13	.05	-.03	.80	.08	.13	.18	.15	.13	.21
DTR1	.12	.20	.05	.00	.84	.09	.12	.08	.13	.11
DTR2	.07	.14	.16	.04	.84	-.04	.08	.13	.23	.17
DTR3	.06	.04	.28	.15	.80	.17	.18	.14	.07	.07
PU1	.23	.08	.13	.16	.26	.76	.24	.17	.06	.17
PU2	.12	.21	.09	.08	.04	.87	.22	.18	.03	.12
PU3	.19	.18	.12	.09	.00	.83	.26	.17	.09	.15
PU4	.18	.15	.18	.12	.03	.80	.27	.16	.19	.16
PU5	.16	.08	.08	.22	.05	.80	.25	.11	.06	.15
PEOU1	.05	.12	.18	.15	.03	.29	.82	.01	.09	.04
PEOU2	.24	.00	.20	.05	.08	.15	.80	.09	.13	.13
PEOU3	.10	.11	.18	.15	.13	.17	.80	.09	.06	.19
PEOU4	.00	.06	.26	.06	.17	.24	.82	.09	-.01	.04
PEOU5	.22	.12	.19	.12	.12	.34	.65	.15	.12	.02
SOP1	.11	.17	.15	.16	.09	.33	.07	.82	.10	.10
SOP2	.14	.19	.13	.17	.18	.14	.16	.81	.20	.19
SOP3	.16	.15	.14	.22	.18	.24	.16	.74	.26	.19
SIN1	.05	.10	.22	.18	.21	.04	.17	.06	.82	.13
SIN2	.16	.16	.18	.10	.19	.08	.07	.20	.81	.14
SIN3	.00	.19	.22	.14	.08	.24	.06	.31	.65	.22
STA1	.18	.22	.14	.15	.09	.32	.08	.15	.15	.78
STA2	.23	.15	.01	.15	.13	.30	.05	.27	.22	.73
STA3	.15	.21	.13	.01	.22	.10	.25	.09	.15	.80

Key: EUI: Emergent Use Intention, UTR: User Trust, PLY: Perceived Playfulness, SEF: Self-Efficacy, DTR: Disposition to Trust, PU: Perceived Usefulness, SOP: Social Presence, PEOU: Perceived Ease of Use, SIN: Situational Normality, STA: Structural Assurance.

Appendix E

Descriptives, Correlations, CR, and AVE of Research Constructs

Construct (CR) (AVE)	Mean	SD	DTR	EUI	PEOU	PLY	PU	SEF	SIN	SOP	STA	UTR
DTR (0.93) (0.81)	4.43	1.48	0.90**									
EUI (0.94) (0.80)	4.22	1.50	0.42**	0.89**								
PEOU (0.94) (0.77)	4.37	1.40	0.37**	0.60**	0.88**							
PLY (0.95) (0.82)	4.15	1.43	0.41**	0.54**	0.54**	0.90**						
PU (0.97) (0.87)	4.77	1.61	0.31**	0.71**	0.61**	0.41**	0.93**					
SEF (0.86) (0.68)	3.96	1.63	0.29**	0.56**	0.50**	0.37**	0.53**	0.82**				
SIN (0.92) (0.79)	3.71	1.37	0.46**	0.47**	0.37**	0.50**	0.40**	0.49**	0.89**			
SOP (0.96) (0.89)	3.93	1.52	0.43**	0.57**	0.42**	0.41**	0.56**	0.56**	0.57**	0.94**		
STA (0.94) (0.85)	3.83	1.54	0.42**	0.66**	0.42**	0.36**	0.55**	0.44**	0.52**	0.55**	0.92**	
UTR (0.97) (0.91)	3.52	1.48	0.50**	0.65**	0.46**	0.42**	0.60**	0.48**	0.58**	0.62**	0.67**	0.95**

Key: DTR: Disposition to Trust, EUI: Emergent Use Intention, PEOU: Perceived Ease of Use, PLY: Perceived Playfulness, PU: Perceived Usefulness, SEF: Self-Efficacy, SIN: Situational Normality, SOP: Social Presence, STA: Structural Assurance, UTR: User Trust

CR: Composite Reliability**, AVE:** Average Variance Extracted

Note: The shaded numbers in the diagonal row are the square roots of the AVE.

n = 197, *p < 0.05, **p < 0.01

Appendix F

Testing for Common Method Bias

Common method bias concerns the amount of spurious covariance shared among variables due to a common data collection method (Malhotra et al. 2006). As the present research employs a cross-sectional study, we had to make sure that no systematic bias influences our data due to the single method of data collection. We took several steps to reduce the common method bias. These included appropriate instrument design and data collection procedures, as suggested by Podsakoff et al. (2003). In addition, we performed statistical analyses to assess the severity of common method bias in the data. First, we performed Harman's one-factor test (Podsakoff and Organ 1986), which is arguably the most widely known test for common method bias in a single-method research design (Podsakoff et al. 2003; Podsakoff and Organ 1986). It requires conducting an exploratory factor analysis on all the measures used in the research, based on the assumption that if common method bias exists, a single factor or a general factor accounting for the majority of the covariance among the measures will emerge (Podsakoff et al. 2003). Accordingly, we examined the factor structure solution emerging from an exploratory factor analysis of all the research variables to determine the number of factors necessary to account for the variance in the variables (Podsakoff et al. 2003).

The test indicated the presence of four major factors accounting for a total of 75 percent of the variance, and the first (largest) factor did not account for a majority of the variance (28%). Because a single factor did not emerge and one general factor did not account for most of the variance, we conclude that common method bias is not a significant problem with the data (Podsakoff et al. 2003). However, Podsakoff et al. (2003) argued that the emergence of multiple factors does not always indicate the absence of common method bias, and additional tests are recommended (Sharma et al. 2009). This is because as the number of latent variables increases in the research model, it is quite unlikely that one factor will explain the majority of variance in the manifested variables. Lindell and Whitney (2001) suggested the use of a marker-variable test for common method bias, as it addresses most of the problems related to Harman's one-factor test. Therefore, we further tested our data for common method variance using Lindell and Whitney's marker-variable method. The results from these tests, discussed below, show that there is no significant problem of common method bias. These tests thus rule out the possibility that common method bias contaminated the results in this research.

Marker-Variable Technique

The marker-variable technique requires the inclusion of a variable that is theoretically unrelated and dissimilar to other variables in the model. As the marker variable is assumed to have no relationship with single or multiple variables in the study, common method bias can be assessed based on the correlation between the marker variable and the theoretically unrelated variables.

We added an additional variable "anxiety" as a marker variable in the model, as it is not very related to the other focal variables in this study. Any correlation observed between the marker variable and the theoretically unrelated variables is possibly due to some systematic influence and is thus interpreted as an estimate of common method variance (Lindell and Whitney 2001). The correlations between the marker variable and other research variables are very low, as indicated in Table 1, Appendix F. In fact, the highest correlation is between structural assurance (STA) and the marker variable, and it is only -0.11. Further, if we square the correlations, we get the maximum shared variance with the other variables in the model, which is about 2%. This shared variance is very low and thus shows that there is no significant problem of common method bias. These results therefore rule out the possibility that common method bias contaminated the results in this research.

Table F1. Correlations of Marker Variable with Other Constructs: Marker-Variable Test for Common Method Bias

	DTR	EUI	Marker	SIN	SOP	STA	UTR
DTR	1**						
EUI	0.42**	1**					
Marker	-0.03	-0.05	1**				
SIN	0.46**	0.47**	0.03	1**			
SOP	0.43**	0.58**	0.13	0.57**	1**		
STA	0.42**	0.66**	-0.11	0.52**	0.55**	1**	
UTR	0.50**		-0.10	0.58**	0.62**	0.67**	1**

Key: DTR: Disposition to Trust; EUI: Emergent Use Intention; SIN: Situational Normality; SOP: Social Presence; STA: Structural Assurance; UTR: User Trust
n = 197; *p < 0.05, **p < 0.01

Appendix G

Interview Questions

1. Which virtual world (e.g., Second Life, Kaneva, etc.) do you prefer? Why? What do you use virtual worlds for?
2. How often do you use a virtual world (usage frequency)?
3. Do you foresee the usage of virtual worlds as an organizational workplace collaboration tool in the near future? If yes, what would be the prime factors that would facilitate their acceptance as an organizational collaboration tool?
4. What are the different types of uncertainties and risks that prevail in virtual worlds?
5. Do you think it is important for users to trust a virtual world in order to use it as a workplace collaboration tool?
6. Which virtual world features mitigate users' perceived risks, thereby enabling development of adequate trust for facilitating utilization of a virtual world in important tasks?
7. In virtual worlds, other avatars are socially present and interacting with other virtual world members. Do you feel that this notion of others being socially present in virtual worlds through their avatars helps you in developing/enhancing your trust in virtual worlds?
8. If you are assured of all the safety and security measures in virtual worlds, does this help you develop trust in the virtual world platform as a collaboration tool?
9. Does the social presence of other virtual world members as avatars help in amplifying the impact of safety/security measures in place? If so, how?
10. Do you think that the presence of other users as avatars in a virtual world helps you perceive the interaction as normal and natural, thereby helping you develop adequate trust in the virtual world platform? If so, how?
11. Do you believe that your creativity and playfulness in using new technologies like virtual worlds helps in developing your intentions to use virtual worlds for organizational tasks like meetings and collaborations? If so, how?
12. Do you believe that your ability and expertise in using virtual worlds helps in developing your intentions to use virtual worlds for organizational tasks like meetings and collaborations? If so, how?
13. Please give any other suggestions you may have for enhancing the usage of a virtual world as a collaboration tool in organizations.

Appendix H

Demographic Profile of Interview Respondents

Gender (Resp. #)	Age	VW Exp. (yrs)	VW Usage Frequency	Nationality	Real-World Profession	VW Profession
F1	27	1.5	Every day	Danish	Quality Assurance	Builder
M1	40	5	Twice a week	Portuguese	Professor	Teaching
M2	40	5	8-10 hours/ week	German	Professor	Teaching
M3	27	0.5	Every day	Chinese	Software Engineer	VW Project Manager
F2	51	5	Every day	Portuguese	Professor	Teaching
F3	Undisclosed	3	Every day	Chinese	Professor	Virtual Education and Multimedia Technology
F4	31	1.5	Every day	Spanish	Accountant	Photography and Fashion Designing
M4	31	8	Every day	Portuguese	Researcher	VW Developer
F5	33	4	Every day	Singaporean	Banker	Model in SL
F6	33	5	Every day	American	Hairstylist	Model in SL
M5	36	4	Every day	Portuguese	Teacher	3-D Builder
M6	49	4.5	Every day	Turkish	Writer	Content Creator
M7	36		Every day	Italian	Shop Owner	Business
M8	27	9	4 times a week	Chinese	System Analyst	Research
M9	49	15	5-9 hours every day	American	3-D Animator	Market Animations
F7	48	4.5	Daily, 12-16 hours/ week	Portuguese	Sales Analyst at a Telecom Company	Tutoring and Photography
F8	41	7	Every day	Portuguese and German	IT Consultant and System Administrator	Develops Virtual Organizations for Companies
M10	58	7	Several times a week	American	Consultant	Strategist and Expediter for Virtual World Projects in Business, Music, Tourism, Arts
F9	35	4	Project-based	Spanish	Science and Culture Communicator	Uses SL for Science Communication Projects
M11	56	5	Every day	Netherlands	Music Professor	Uses SL for Promoting His Music and Himself
M12	27	5	5 hours/ week	Indian	Student	Organizational Tasks
M13	“GenX”	10	1-3 hours/ week	American	Writer	Writes about SL and Develops Projects in SL
M14	55	9	5 hours/day every day	French	Executive in Human Resources in a Company	Uses SL to Create and Sell Virtual Goods
F10	47	6	Every day	American	OpenSim Hosting Provider	OpenSim Hosting Provider

Gender (Resp. #)	Age	VW Exp. (yrs)	VW Usage Frequency	Nationality	Real-World Profession	VW Profession
F11	46	10	70 hours/ week	American	Owner and Designer of a Company that Develops VW Content	Develops Projects for Clients
F12	40	6	Several hours every day	American	VW Developer	VW Developer
F13	45	1.5	Every day	Portuguese	Teacher	Participates in Meetings
F14	27	3	One day/ week	Portuguese	Pedagogical Consultant	Educational and Working Proposals
M15	37	5	Twice per week	Portuguese	Computer Science Researcher	Virtual World Researcher

Appendix I

Illustrative Example of Template for Qualitative Analysis of VW User Responses

Responses	Initial Coding		Consensus Coding
	Coder 1	Coder 2	
I am pretty sure of its (VW's) safety and security, as long as you keep the things in control.	STA(+)	STA(+) UTR(+)	STA(+)
I trust to use virtual worlds for serious workplace tasks like collaborations and meetings. At least in Second Life, there are all sorts of options to enable privacy and security in your virtual space.	STA(+) → UTR(+)	STA(+) → UTR(+)	STA(+) → UTR(+)
3-D Web is a workplace collaboration tool for me. In the beginning the collaboration was on building 3-D Web environments such as Dublin Virtually Live. Collaboration proceeded further on producing events transmitted through 3-D Web to audiences.	EUI(+)	EUI(+)	EUI(+)
I have made my living from graphical virtual worlds since 2003. Creativity and playfulness are what got me into the business in the first place.	PLY(+) → EUI(+)	PLY(+) → EUI(+)	PLY(+) → EUI(+)
I worked as a greeter in-world about 3 years ago and at that time, there were already many big name companies having their presence in-world to use Second Life as a workplace collaboration tool and hold meetings for their staffs in-world with employees that were located all over the world.	EUI(+)	EUI(+)	EUI(+)
It's an easy, convenient, and inexpensive way of having a group of people working together and feeling close through this virtual world, no matter where they really are.	PEOU(+)	PEOU(+)	PEOU(+)
Another reason for the usage of virtual world as a workplace collaboration tool is that company will be able to expose to a new target market that may not be reachable in real life, especially to overseas group of users in-world.	PU(+) EUI(+)	EUI(+)	EUI(+)
At the end, ability to use the technology is what counts. Putting ideas into concepts and finally into a working virtual world model/solution.	SEF(+)	SEF(+)	SEF(+)
Somebody who's already creative and gets into 3-D Web is always going to start thinking of ways to develop it for meetings and collaboration—in fact, that's going to have to happen, I think, for it to even to occur for an organization.	PLY(+) → EUI(+)	PLY(+) → EUI(+)	PLY(+) → EUI(+)
If another user tells me they think it's safe, that reassures me, and if another user tells me they think it's not safe, then that makes me feel anxious.	SIN(+)	SIN(+) → UTR(+)	SIN(+) → UTR(+)
Trust comes from track record from a series of good experiences and also just like in real life, if you have a bad experience and get over it successfully	UTR(+)	SIN(+) → UTR(+)	UTR(+)
All we need for more user trust and increased usage of virtual world for work-place collaborations is: reliability, flexibility, and usability. More solid platforms that do not crash often; sims that are maintained good with a 7/24 instant help desk solving all possible problems; good bandwidth and clean connection without lag; and an as smooth as possible learning curve for new users .	PEOU(+) → EUI(+)	PEOU(+) → EUI(+) UTR(+) → EUI(+)	PEOU(+) → EUI(+)
The 3-D VW will be accepted if there is minimum learning curve. So it is time to learn and become fluent with the browser.	SEF(+) → EUI(+)	SEF(+) → EUI(+)	SEF(+) → EUI(+)
Safety of the virtual world platform is essential. Anyway the interaction with other people improves the immersion of users. Users feel as if they are physically within the virtual world.	UTR(+)	SOP(+) UTR(+)	UTR(+)

Coding Scheme: EUI: Emergent Use Intention, UTR: User Trust, PLY: Perceived Playfulness, SEF: Self-Efficacy, DTR: Disposition to Trust, PU: Perceived Usefulness, SOP: Social Presence, PEOU: Perceived Ease of Use, SIN: Situational Normality, STA: Structural Assurance, OTR: Others; → implies cause-effect relationship

Appendix J

Results: Structural Model (with Individual and Technology Use Controls on UTR)

	UTR			EUI	
	Control Model	**Direct Model**	**Interaction Model**	**Control Model**	**Direct Model**
Control Variables	**β**	**β**	**β**	**β**	**β**
DTR	0.30**	0.16*	0.16**		
Age				0.02	0.02
Gender				0.02	0.02
IT Prof				0.00	0.00
Education				0.07	0.07
Individual Variables as Controls					
SEF	0.15**	0.01	0.04		
PLY	0.08	0.01	0.02		
Technology Use Variables as Controls					
PU	0.41**	0.22*	0.24**		
PEOU	-0.02	0.01	0.01		
Independent Variables					
SIN		0.15*	0.13*		
STA		0.30**	0.33**		
SOP		0.17*	0.16*		
UTR					0.66**
Interaction Terms					
SOP × SIN			0.23**		
SOP × STA			-0.15*		
R^2	**0.50**	**0.62**	**0.65**	**0.03**	**0.44**
ΔR^2		**0.12****	**0.03***		**0.41***

n = 197, *p < 0.05, **p < 0.01

Key: DTR: Disposition to Trust, EUI: Emergent Use Intention, SEF: Self Efficacy, PLY: Playfulness, PU: Perceived Usefulness, PEOU: Perceived Ease of Use, SIN: Situational Normality, STA: Structural Assurance, SOP: Social Presence, UTR: User Trust

Appendix K

Stepwise Results: Structural Model (with Individual and Technology Use Controls on EU)

	UTR			EUI	
	Control Model	**Direct Model**	**Interaction Model**	**Control Model**	**Direct Model**
Control Variables	**β**	**β**	**β**	**β**	**β**
DTR	0.50**	0.16*	0.16*		
Age				0.10*	0.10*
Gender				-0.01	0.01
IT Prof				-0.05	-0.03
Education				0.09*	0.08
Individual Variables as Controls					
SEF				0.18**	0.13*
PLY				0.23**	0.19**
Technology Use Variables as Controls					
PU				0.46**	0.37**
PEOU				0.12	0.12
Independent Variables					
SIN		0.16*	0.14*		
STA		0.38**	0.42**		
SOP		0.25**	0.25**		
UTR					0.25**
Interaction Terms					
SOP × SIN			0.18*		
SOP × STA			-0.16**		
R^2	**0.25**	**0.59**	**0.61**	**0.64**	**0.67**
ΔR^2		**0.34****	**0.02***		**0.03***

n = 197, *p < 0.05, **p < 0.01

Key: DTR: Disposition to Trust, EUI: Emergent Use Intention, SEF: Self Efficacy, PLY: Playfulness, PU: Perceived Usefulness, PEOU: Perceived Ease of Use, SIN: Situational Normality, STA: Structural Assurance, SOP: Social Presence, UTR: User Trust

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