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Command and Control in Virtual Environments:
Using Contingency Theory to Understand Organization in Virtual Worlds

by

Mark E. Nissen

October 2010

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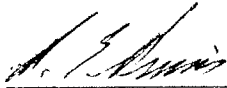
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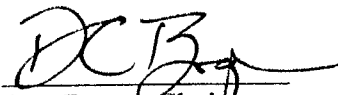
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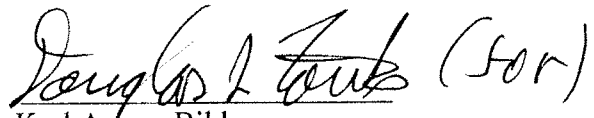
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ABSTRACT

Organization Contingency Theory has served us well for more than half a century. It enjoys abundant empirical support and guides organizational design and change across a broad diversity of contingencies, in terms of command and control as well as organization and management. Through a combination of research and practice we understand how organizations are designed to fit their environments, technologies and other contingencies individually as well as simultaneously. An emerging phenomenon is straining this understanding, however, as new organizations are spawning wholly within virtual worlds. Here the organization and its environment exist solely within technological artifacts. This raises an important organizational design question regarding the fit of such organizations with their virtual environments and corresponding technologies. From one perspective, we can argue that virtual worlds are not important beyond recreation and game playing, that textbook principles of Contingency Theory and organizational design apply to virtual worlds directly, and that our extant understanding of telework, electronic commerce, network-centric operations, and virtual organization is sufficient. From an alternate perspective, many serious organizations are emerging within such worlds, worlds which have few physical constraints. Also, advances in graphics technology and cinematic engagement enable unparalleled levels of immersiveness that can induce sustained psychological engrossment in virtual worlds, along with time investments and emotional commitments comparable to or exceeding those associated with physical organizations. As part of a continuing initiative on command and control (C2) in virtual environments, the research described in this article takes neither perspective but uses Contingency Theory to understand organization in virtual worlds. Through immersive and extensive ethnographic research within virtual worlds, intriguing new insights into Contingency Theory and organizational design emerge, and we begin to outline a framework for understanding how and where C2 can be enhanced through virtual world immersion.

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I. INTRODUCTION

Contingency Theory has served very well for more than half a century [1]. Beginning with seminal works by Burns and Stalker [2], Woodward [3], Lawrence and Lorsch [4] and others, organization and management theory has been guided by the understanding that organizational fit affects performance and that no single approach to organizing is best in all circumstances. This applies equally to military and government command and control (C2) as well as organization and management in business [5]. Indeed, Lawrence and Lorsch [6] indicate that the “general notion of fit has become almost axiomatic” (p. xii) in modern studies of organization and management science, and the contingency approach to organizational design applies across many, diverse organizational forms, types and configurations [7].

Contingency Theory enjoys abundant empirical support. Myriad empirical studies (e.g., [8-11]; cf. [12, 13]) in the organization and management sciences have confirmed and reconfirmed that poor organizational fit degrades performance, and many diverse organizational structures (e.g., Functional, Decentralized, Mixed, see [14]), forms (e.g., Bureaucracy, see [15]; M-Form, see [16]; Network, see [17]; Clan, see [18]; Platform, see [19]), configurations (e.g., Machine Bureaucracy, Simple Structure, Professional Bureaucracy, Divisionalized Form, Adhocracy, see [20]) and other groupings have been shown to reflect design fit with their contingency sets.

Further, this knowledge guides organizational design and change across a broad diversity of contingencies. Through a combination of research and practice we understand how organizations are designed to fit their environments, technologies and other contingencies individually as well as simultaneously. *Organizational environment*, for instance, represents a longstanding and particularly important contingency factor for organizational design [2, 21-23]. Many alternate environmental characteristics (e.g., *complexity, change*) can be related contingently with different organizational structures (e.g., *Functional, Decentralized*, see [14]) to improve fit. *Organizational technology*, as another instance, represents a longstanding and particularly important contingency factor also [3, 24, 25]. Numerous alternate technological characteristics (e.g., *task variability, problem analyzability*) can be related contingently with different organizational forms (e.g., *Craft, Engineering*, see [26]) to improve fit as well.

In addition to exogenous contingency factors along these lines (e.g., including environmental shocks, technological shifts and regulatory changes; see [27-29]), research shows how organizational forms are and should be designed and changed to fit endogenous contingency contexts as well. For several instances, strategic choice [30-32], cultural change [33] and management intervention [34, 35] are noted as important contingency factors. Fit with endogenous contingencies is just as important as with their exogenous counterparts [7, 36]. Indeed, building recently upon such research, Burton et al. [7] identify a coherent set of 14, exogenous and endogenous, contingency factors (e.g., *goal, strategy, environment*) that an organization must address in an integrated manner, and they leverage considerable prior research (e.g., [37-40]) to augment our understanding of contingent organizational design around multiple factors.

An emerging phenomenon is straining this understanding, however, as new organizations are spawning wholly within in virtual worlds [41]. Here the organization and its environment exist solely within technological artifacts [42]. More than simply metaphor for organization [43], organizational environment and technology meld into one, confluent contingency that blurs the line between what we consider real and virtual [44, 45].

Organizations within such virtual worlds are real in the sense that collectivities of people band together to accomplish (at least partially) shared goals [46][47], but they are virtual in the sense that they have no presence or counterparts outside of their graphically rendered environments. They are real in the sense that participating people perceive them as functioning organizations, subject to structuration [48], "... as socially constructed entities, with various aspects of organizational life being negotiated through organizational policies and through everyday interaction among individuals" [41] (p. 134), but they are virtual in the sense that such organizations, policies and interactions take place only within technology enabled virtual worlds. This raises an important organizational design question regarding the fit of such organizations with their virtual environments and corresponding technologies.

From one perspective, we can argue that virtual worlds are not important beyond recreation and game playing [49], that textbook principles of Contingency Theory and organizational design [46] apply to virtual worlds directly, or that our extant understanding of telework, electronic commerce, network-centric operations, and virtual organization is sufficient [50]. Contingency Theory research has developed, progressed and applied very well through many decades of sustained technological advance, including our transition to the current ubiquity of computational technologies in the organizational environment and trends toward virtual organization in business [51], military [52] and other operations. To the extent that organizations in virtual worlds are real as described above, Contingency Theory should apply well, and fit should be achievable through direct application of the organizational design knowledge and understanding that we possess now.

From an alternate perspective, many serious organizations (e.g., marketing, architecture, real estate) are emerging within virtual worlds [53], and the "population" [44] (p. 2) and per capita "gross domestic product" [42] (p. 19) in some virtual worlds exceed those of major nations across Europe, Asia and elsewhere [41]. Also, virtual worlds have few physical constraints (e.g., teleportation is a common mode of transportation; death is inconvenient but temporary; altering one's appearance unrecognizably requires only a few mouse clicks) on what organizations can accomplish [54], and "money" within many virtual worlds is traded daily via active (albeit mostly underground) markets with ready exchange rates to major real world currencies (e.g., US dollars). It is not immediately clear how well our understanding of Contingency Theory applies to enhance the fit of organizations in such technology-environments of virtual worlds.

Moreover, advances in graphics technology and cinematic engagement enable unparalleled levels of immersiveness that can induce sustained psychological engrossment in virtual worlds [55]. More than computers as theater [56], users in many virtual worlds write and enact their own scripts, constitute the audience as well as the

cast, and come to think of computational representations of themselves (e.g., via computer avatars) in emotional and personally identifiable ways [42, 45]. As one of several, multiple realities [57] or frames of experience [58], a virtual world has meaning to its inhabitants [59] (p. 217) as the real world does. Participation in such realities or frames through computer avatars also obscures participants' identities from others and limits their accountability [54]. Participants' computer avatars are identified only via pseudonyms for the most part, and the cultures of many virtual worlds center on preserving anonymity and separating virtual world identities from their real world counterparts. Indeed, many virtual worlds are described as having completely different cultures from those found in the real world [42]. It is not immediately clear how well our understanding of Contingency Theory applies to enhance the fit of organizations comprised of such participants and cultures.

Further, time investments made by people in some virtual worlds are comparable to or exceed those in real world organizations. For instance, tens of millions of people spend 20 – 30 hours a week (i.e., equivalent to part-time employment) in virtual worlds [60], and these are not just kids playing video games after school; virtual worlds are inhabited by people of all ages [42], with the average participant's age estimated between 27 and 31 [41, 42, 60] and reflecting considerable variation. Plus, emotional commitments to organizations in virtual worlds can exceed those associated with physical organizations in the real world. For several instances: roughly 20% of participants in one survey report a virtual world as their "real world" [42] (p. 2); nearly a third of participants in another survey report that experiences in virtual worlds are more rewarding, satisfying and frustrating than counterparts in the real world are; and nearly half report that participation in virtual worlds improves their real world leadership skills [60] (pp. 322-323). Many participants characterize time spent in virtual worlds "as a second job," and for some, participation in virtual worlds is "more stressful and demanding than their actual jobs" [45] (pp. 69-70).

This has real economic and social consequences; as people are spending time inhabiting and participating in virtual worlds, they are not spending that time at the local bowling alley, mall or restaurant in the real world. Likewise, the real money that people spend on subscription fees, computer equipment and networking services to support their participation in virtual worlds is not spent for bowling, shopping or dining out in the real world, and the time that people spend in virtual worlds is time not spent interacting with others in the real world.

Also, quite distinct from most organizations in the real world, people in such virtual worlds voluntarily pay real money for the privilege of engaging in them. This goes beyond the manner in which people pay to watch a movie or play at the theater, to experience an amusement park, to take an exotic vacation, or like forms of entertainment and recreation—although this is clearly a major role of virtual worlds; few people in movies, plays, amusement parks or vacation locales organize themselves to produce economic outputs as goal-directed collectivities, for instance. Imagine an organization in which people *pay their employers* for the privilege of working. It is not immediately clear how well our understanding of Contingency Theory applies to enhance the fit of organizations comprised of people willing to pay for their participation in them.

Beyond just fantasy worlds [59] or unproductive environments—like the mythical islands of lotus eaters encountered by Odysseus [61]—virtual worlds have many attributes that make them real, and serious organizations emerging within them merit serious scholarly examination [62]. As part of a continuing initiative on command and control (C2) in virtual environments, the research described in this article takes neither perspective but uses Contingency Theory to understand organization in virtual worlds.

The following section provides an overview of the research method, which centers on immersive ethnographic study to examine organization from within virtual worlds. The results follow in turn, illuminating intriguing new insights into Contingency Theory and organizational design. Such insights help us to begin outlining a framework for understanding how and where C2 can be enhanced through immersion in virtual worlds. Conclusions, implications and an agenda for further research along these lines serve to close the article.

II. RESEARCH METHOD

In this section we provide an overview of the research method. We begin by elaborating what we mean by “virtual world” and progress in turn to describe our research approach and data-collection techniques.

The term *virtual world* means many things to many people, and there is little general agreement regarding what constitutes, much less defines, a virtual world. Some see virtual worlds in the background, for instance, reflecting little or no difference with commonplace technology applications [49, 50, 63, 64]. Others, as a contrasting instance, view virtual worlds in the foreground, as unique and distinct from the real world [41, 55]. Blending and balancing these views [42, 44, 45, 63], we see virtual worlds through a middle ground lens: as computer-mediated environments that participants perceive to be distinct from the real world but that exhibit spillover effects (e.g., economic, social, cultural) between the real and virtual worlds.

We do not attempt to define *virtual world* here, however, for that would impose an *etic* perspective on a phenomenon that does not appear to be understood well from the outside at present. Instead, we seek an *emic* perspective [65] to understanding organization in virtual worlds from within, a perspective indicated as important by numerous researchers of virtual worlds and like parallel frames of experience that have meaning to their inhabitants [59, 62, 66]. This leads us to employ an immersive ethnographic method. Indeed, an implicit description of virtual world characteristics emerges through our investigation.

Working primarily as participant observers [67] in multiple virtual worlds, we gain direct experience with the people, activities and cultures associated with them, we develop online identity and reputation within such virtual worlds, and we both observe and participate in collectivities as they may emerge, operate, disband and otherwise organize collective goal-seeking actions.

Using constant comparison for developing insights that are grounded well in the qualitative field data, we iterate repeatedly between data collection and analysis to approach saturation [68]. We also employ purposeful sampling, identifying and pursuing promising leads as they emerge through the study. Archival analysis and repeated progressions between first- and second-level [69] coding of text logs are important in this study, but the most significant insights are developed through extensive reflection on and memoing of [70] our encounters and experiences as participant observers immersed within virtual worlds.

More specifically, using data-capture tools provided as part of the virtual environments, we collect logs of many text chat discussions taking place within these virtual worlds, and we save numerous screenshots of user views. Indeed, we collect and analyze roughly 1500¹ pages of time stamped text in this way. Both of these data-capture activities are noninvasive and common among participants. Indeed, they represent normal aspects of participation. However, we do not attempt to record any of the voice conversations that occur, nor do we disclose our identities or foci as researchers. Audio recording is not a normal aspect of participation, and few people participating within

¹ This reflects roughly 2.5 MB of simple text files.

these virtual worlds disclose their real world identities and underlying reasons for participation. Hence our approach to data collection within these virtual worlds is culturally conforming.

We begin this investigation by examining a number of different and diverse, principally text-based, computer rendered technology environments (e.g., including those centered on e-mail, text messaging, web pages, social media sites) at first, but these do not appear to engross participants with the same level of emotional commitment noted above as characteristic of many virtual worlds. We continue then by examining more immersive, 3D graphical environments comprising console- and computer-based as well as online video games (e.g., first-person shooter, real-time strategy, role-playing), but they tend to be played only by individuals or in very small groups, and hence do not accommodate the comparatively massive number of participants and persistence noted above as characteristic of some virtual worlds.

This leads us to examine massive online communities and games, with millions of participants reporting engrossment, emotional commitment and large time investments in them [42, 60, 66]. The results below focus in particular on two such online communities and games: Second Life and World of Warcraft. Second Life [71] describes itself as, “a free, 3D virtual world,” and World of Warcraft [72] is a subscription-based online multiplayer game environment with the catch phrase, “10 million people can’t be wrong.” Together, these report a combined population of participants approximating the number of people residing presently in the State of California.

The investigator opens accounts and participates actively in both of these virtual worlds over a period of more than a year. Online participation in these virtual worlds varies but averages 20 to 30 hours each week (i.e., 1500 – 2000 hours in total), thus reaching levels reported commonly for inhabitants of virtual worlds and allowing ample time for the kinds of cultural and environmental immersion noted as important for qualitative research [73].

III. RESULTS

In this section we discuss the results. We begin by describing the Second Life and World of Warcraft environments for background and reference. We then concentrate on organizations and organization within them.

A. SECOND LIFE

Second Life (SL) is a persistent, massively multi-user, computational environment that is rendered in three dimensions with motion and that permits users to represent themselves within such environment via computer avatars. Users are able to create and dress relatively elaborate avatars to resemble nearly any humanoid, move them freely throughout the environment, and use them to interact with other users via their corresponding avatars. The SL world as visualized from the perspective of a user's avatar is immense: very many orders of magnitude greater than what can be "seen" through any one avatar's eyes at one time (e.g., equivalent to land extending well beyond the horizon).

In terms of geography, this world is comprised of myriad "islands," which can be reached by flying (e.g., avatars can fly, run, walk, stand and sit) or more commonly teleporting (e.g., one can input the map coordinates of a destination and travel there instantaneously). Once at a destination, users can maneuver their avatars through 3D virtual renderings of buildings, streets, malls, buses, rivers, lakes, oceans, skies, fields, mountains, valleys and like representations of artifacts common in the real world. Users can move and look around in all directions within this virtual world; they see their avatar and those of other users within a viewing distance and perspective that looks very similar to what we experience daily in the real world. Most artifacts within this virtual world resemble equivalent artifacts in the real world, and many artifact builders seek to replicate the real world closely. Figure 1 provides a screenshot of multiple users' avatars gathered together and interacting in a common location.

Users communicate principally through text chat, but avatars come with a rich set of emotive actions (e.g., laughing, shrugging, yawning), and it is possible to overlay voice communication. Body language (e.g., turning one avatar's back to another's, walking away, standing closely during a conversation) plays a role in this virtual world, but facial expressions and like, subtle, nonverbal cues are relatively primitive. Each avatar has a unique identity (i.e., a pseudonym) that is viewable readily by all other users. An avatar's pseudonym has little in common with and gives little hint of the user's real world identity, however, so users inhabit, explore and interact within this virtual world anonymously. A person in the real world may choose to divulge his or her SL avatar's name to another person outside of the virtual world, but this is not required to participate in the virtual environment. Likewise, a user within this virtual world may choose to divulge his or her real world name to another person within SL, but this is not required to participate in either world either. Indeed, both of these actions represent exceptions to the general behavior observed.

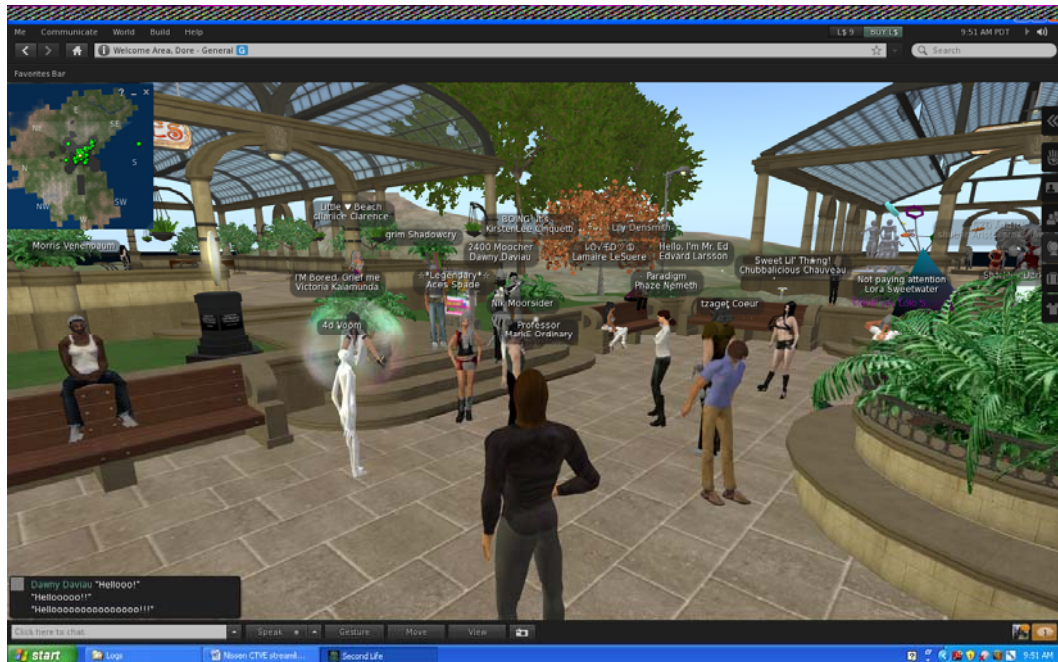


Figure 1 Second Life Screenshot

Like many such environments referred to as “virtual worlds,” SL is persistent. Buildings, yards, malls, pools, streets, fire hydrants, rivers, buses and like virtual world artifacts are rendered equivalently to all users (i.e., every user, from every computer, and in every location around the real world visualizes the same artifacts in the same way) and available to all users at all times, whether or not any particular user is logged on and accessing the environment or not. Each user is able to change his or her avatar at will, so the avatar will appear differently to others, but the shared, graphically rendered environment inhabited by such avatars does not change as a result.

Although persistent, such environment is dynamic, however. For instance, users have the ability to purchase “land” (i.e., with real world currency such as US Dollars; although basic access to SL is free, some more advanced capabilities such as buying land require real world money to be spent outside of the virtual world) and build artifacts such as those listed above. If a particular user views an open field on a Friday, and a different user constructs a building in that area over the weekend, then the former user will see that field with the building when he or she returns to the environment on Monday. Hence this virtual world is persistent yet dynamic.

An important aspect of the SL virtual world centers on the absence of designed agendas, communities and organizations. Users have free choice to decide where to go and what to do within this world. Such world is not embedded within a game or attached to scripts or similar design attributes to focus user attention or steer behavior in any particular direction. Users are left to themselves to decide how to inhabit and explore this world. Similarly, each user is alone in the sense that his or her avatar is created without affiliation to any community, organization or other collectivity. As described in greater detail below, many users do establish friends, pool their interactions in terms of groups and organize their collective activities, but one would not consider this a design feature of the virtual world. Users are free to pursue such affiliation, but they do so through their

own initiative. An interface feature for selecting and retaining “friends” and joining “groups” facilitates but does not encourage this.

Finally, there are several forms of wealth identifiable within the SL virtual world. The one noted above involves land ownership; this requires using real world currency to purchase virtual world land from the designers outside of the virtual world. Here we see an obvious link between the SL virtual world and the real world: the more real world money that one applies to this virtual world in terms of land ownership, the more visible wealth that a user will have within the virtual world. There is also a currency within SL (i.e., the Linden Dollar), which users can spend on various artifacts within the virtual environment (e.g., to purchase different outfits for an avatar). This currency has a fixed exchange rate through the designer, but individuals in the real world exchange Lindens for a variety of hard currencies and at varying rates on open markets too.

The sophistication of artifacts within this virtual world can be viewed as another manifestation of wealth. SL offers access to a scripting language that can be used to modify aspects of this virtual world (e.g., constructing buildings, enabling avatars to exhibit novel behaviors, tailoring new outfits), and as a limited programming language, it requires some skill and expertise to use; the time spent learning to use this scripting language—or the real world money spent hiring others to do so—can translate into visible wealth within the virtual world. Some aspects of wealth within the SL virtual world spill over into the real world as well, as reports describe real world millionaires making their fortunes through SL organizations [74] and real world organizations taking their businesses to SL [75].

B. WORLD OF WARCRAFT

World of Warcraft (WoW) shares most of the characteristics of the SL virtual world outlined above, but it reflects several key differences. For one, users cannot purchase “land” or construct buildings and other artifacts; the graphical environment rendered within this virtual world is persistent, but it remains relatively static and is not modified by users (i.e., only the designers can modify the virtual environment). Using the SL example above of a building constructed in an open field, one would not see this in WoW; if an open field is present in the virtual environment on a Friday, then one can count on *that same* open field being there still on the following Monday.

Some other differences pertain to the kinds of humanoid avatars that can be created (e.g., WoW has a number of different “races” such as Dwarf, Elf and Human), the kinds of items available to dress them (e.g., most WoW avatars carry weapons), the geography (e.g., WoW has various cities and lands spread across “continents”) and transportation (e.g., avatars can ride horses and fly griffins when they reach a certain level, but teleportation is more restricted). Figure 2 provides a screenshot of multiple users’ avatars gathered together and interacting in a common location.



Figure 2 World of Warcraft Screenshot

Also, the context of WoW (e.g., set to resemble medieval lands and societies) differs considerably from most contexts observable in SL, and such context in WoW is consistent throughout the virtual world. Each SL user constructs artifacts in diverse locations in a pattern that appears to be random overall, whereas the entire WoW virtual world has been designed according to an easily recognizable theme. Further along these lines, there is no story imposed upon participants of the SL virtual world; any stories or histories emerge endogenously and solely through user interaction. Alternatively, WoW comes with rich history [76] and lore (e.g., key events, civilizations, rulers, wars) articulated by the designers to be consistent with the thematic environment of this virtual world; users' stories and histories emerge endogenously through interaction in WoW too, but they do so in parallel with—and in most cases are subordinate to—those that have been articulated by designers.

Perhaps the most striking difference is that WoW is a game. Users create avatars to play this game, which is replete with designed agendas (e.g., “quests” to accomplish objectives consistent with the theme and storyline), and every user is placed in a community (e.g., determined by “race”) and organization (e.g., one of two major “factions”) on Day 1. Indeed, WoW users have an extensive agenda and can play the game nearly independently of others (e.g., seeing but choosing not to interact with other users). The WoW game has many challenges, and user progress through the game depends almost entirely upon skill and experience developed through game play. The SL environment has little correspondence to these aspects of WoW.

Additionally, WoW avatars are much, much more complex than their SL counterparts are, and time-critical aspects of WoW avatar actions and interactions require much greater knowledge and skill on the part of users. The typical SL avatar, for instance, can move through the virtual world, interact with artifacts in the virtual world, and serve as a communication medium (esp. via text chat) with other users through their avatars. Figure 3 presents a SL interface screenshot and depicts select actions available to users. This user's avatar can, for instance, move within or beyond the virtual room pictured, stand or sit in one of the virtual chairs, communicate with friends and others beyond viewing distance, interact with one or more of the virtual computers represented on the virtual desks, search for and teleport to other locations, along with viewing and interacting with the other users' avatars outside this room or anywhere that they happen to be in the virtual world.

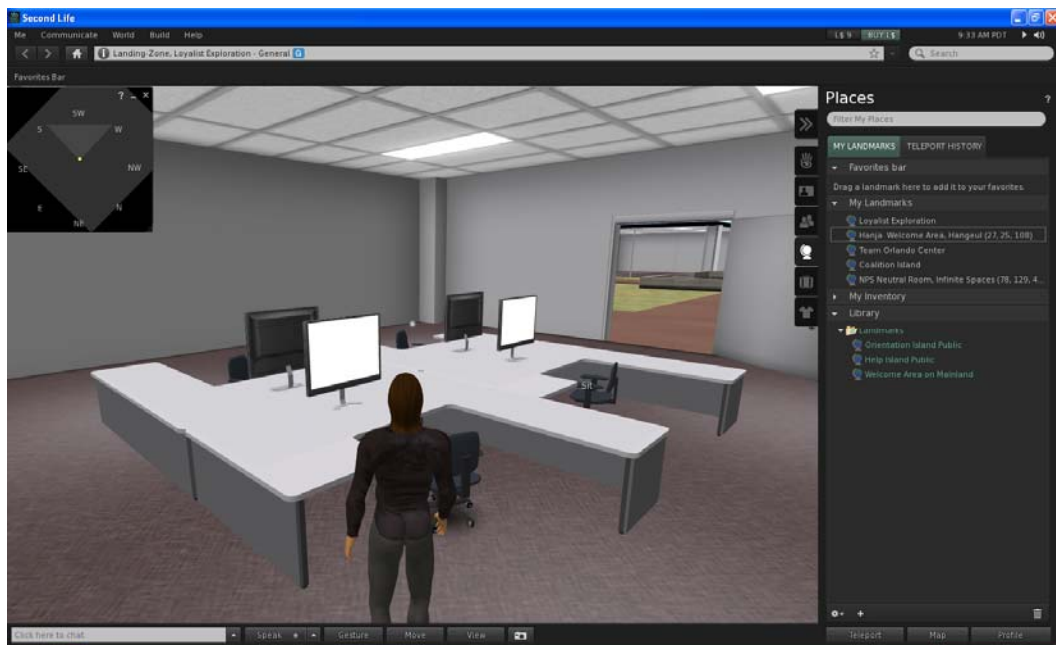


Figure 3 Select Second Life Actions

The typical WoW avatar performs most of these actions also, albeit some to greater and lesser extents. However, the WoW virtual environment imposes time pressure and performance requirements for success with in-world quests, and different kinds of virtual weapons, equipment and character features affect avatar performance (esp. with respect to computer-controlled characters) immensely. As an avatar accumulates experience, strength and stamina, for instance, it can prevail against more powerful adversaries, and as it equips with advanced gear and weapons, such performance against adversaries increases in complement. A user has several dozen decisions to make regarding gear and weapon selections, for instance, many of which interact with one another in complex ways and change periodically as the avatar becomes more capable (e.g., most gear and weapons have minimum “experience” levels associated with them). Changing an avatar outfit in SL affects the way the character looks, but doing so in WoW affects its performance as well.

Users have great latitude in terms of specializing their avatars too. As noted above, each user chooses a race (e.g., Dwarf, Elf and Human) for his or her avatar in addition to a “class” (e.g., Paladin, Priest, Hunter) and “specification” (e.g., Protection, Holy, Marksman), which requires many user decisions and permits myriad variations. A Dwarf Paladin, for example, comes with a prespecified, designed-in set of characteristics, capabilities and behaviors, which the user can complement, leverage or even offset through gear and weapon selections, for example, but the user also has discretion regarding a “Talent Tree” that determines the avatar’s specification. The user chooses 71 different “talents” (e.g., that enhance strength, stamina, speed, weapon skill) from among a couple hundred that influence the avatar’s capabilities principally.

Continuing with the Dwarf Paladin example, such avatar can reflect a talent tree specification focused on healing (i.e., “Holy Paladin”), for instance, or a different and mutually exclusive specification focused instead on tanking (i.e., “Protection Paladin”) or damage (i.e., “Retribution Paladin”). The same applies to other classes. The specific choices a user makes even within any single specification (i.e., the specific 71 talents selected from among the 200+ alternatives²) can make demonstrable differences in terms of avatar capability and performance, differences which can be magnified through complementation with gear and weapon choices. One could say conservatively that an immense number³ of different “builds” (i.e., race, class, talent specification, gear and weapons) are possible. User’s specific choices affect avatar performance directly and require considerable knowledge.

Moreover, WoW avatars have many different capabilities that must be sequenced and coordinated by the user in real-time to accomplish most quests and like in-world activities. Our principal avatar, for instance, has roughly 50 different actions (e.g., weapon options, defensive maneuvers, movement capabilities) laid out across five action bars on the user interface. Using the most appropriate actions, in the most complementary sequences, at the most effective times affects avatar performance appreciably. One can compare the performance of two or more, equivalently equipped avatars directly (e.g., through a DPS meter) and notice great differences. Considerable user knowledge and coordination is required to use an avatar effectively. Figure 4 presents a WoW interface screenshot and depicts select actions available to users.

² The current paladin talent trees include 76 Holy, 72 Protection and 66 Retribution choices for a total of 214.

³ Consider, for example, that a user chooses 71 from among 214 talents available and combines the resulting specification with 19 gear and weapon selections from among 100 reasonable alternatives available. The number of possible combinations (e.g., assuming, conservatively, that order is not important) is approximately 9×10^{77} ; this reflects an immense number of character differences for each of ten classes.



Figure 4 Select World of Warcraft Actions

In a battle against a computer-controlled adversary, for instance, a user is selecting a different action every second or two and reacting via avatar movements and actions to adversaries' activities as well as the user's own, adaptive tactics. More than just controlling an avatar, one must manage a complex set of time-sensitive capabilities. Using a WoW avatar gives the sensation of managing a small staff of people or squad of soldiers with diverse capabilities requiring situated and time-sensitive integration. This aspect of management and time-critical action is absent from the SL virtual world.

WoW also has myriad computer controlled avatars (e.g., playing roles of different virtual world inhabitants, such as merchants and vendors, and various creatures, "good" and "bad") to promote the story line and interact with users' avatars. Indeed, a central aspect of the game involves using avatars to "trade" with vendors and employing avatars' weapons to "kill" computer controlled avatars (and to avoid being killed by them). Users also have limited opportunities for their avatars to fight against and "kill" those of other users, but users have immense control over whether and when to engage in such player vs. player combat. These aspects of the WoW virtual world are absent from SL too.

Finally, wealth plays a role within the WoW virtual world also and has identifiable links to the real world as well. As noted above, users cannot own land, but they can acquire a wide variety of different weapons and other equipment for their avatars. This involves using currency earned within the game (e.g., completion of most quests comes with a monetary reward as part of the game) to make purchases from computer controlled "vendors" and other users in an in-game auction house; the more virtual world currency (i.e., denominated in terms of "gold," "silver" and "copper") one's

avatar possesses, the more and more capable weapons and equipment a user can buy. There are real world black market exchanges that trade WoW currency too, but they are not part of the virtual world itself or sanctioned by the designers. Similarly, WoW users can use real world money—unofficially—to purchase virtual world money and hence assets, and some users earn real world currency through virtual world services [77]; this is consistent with the SL virtual world but not part of the WoW game.

Perhaps even more prominent than virtual world assets, a principal manifestation of wealth in WoW involves “experience.” As users maneuver their avatars through different parts of the virtual world, complete different quests, and follow other aspects of the game, storyline and agenda, they earn experience points (“XP”). The more XP they earn, the more capable their avatars become (e.g., able to defeat more challenging computer controlled characters, able to complete more demanding quests, able to own and use more powerful weapons) and the more regions of the virtual world they are capable of exploring and inhabiting (e.g., some lands are inhabited by very powerful computer controlled characters that will kill low-level avatars quickly). Accumulating experience takes considerable time (e.g., months) and effort (esp. completing quests); hence the experience level of an avatar can be viewed as a manifestation of wealth. Indeed, every avatar is identified to other users principally by two⁴ key pieces of information: 1) a pseudonym similar to those viewable in the SL virtual world, and 2) the avatar level; this experience aspect of WoW is quite distinct from the SL virtual world.

C. VIRTUAL WORLD SUMMARY

To recapitulate the results of this initial, highly exploratory look at several online tools, applications and environments, our examination of principally text-based, computer rendered technology environments, including, for instance, e-mail, text messaging, web pages, social media sites reveals that, although computer-mediated and often-engaging, such environments do not appear to engross participants with the same level of emotional commitment noted above as characteristic of many virtual worlds. Further, our examination of more immersive, 3D graphical environments, including, for instance, console- and computer-based as well as online first-person shooter, real-time strategy and role-playing video games reveals that, although computer-mediated and often-engrossing, such environments do not appear to accommodate the comparatively massive number of participants and persistence noted above as characteristic of some virtual worlds.

In contrast, our examination of massive online communities and games, with millions of participants reporting engrossment, emotional commitment and large time investments in them, reveals computer-mediated environments reflecting many features reported as characteristic of virtual worlds. In particular, the Second Life community and World of Warcraft game present the user with computer rendered 3D graphical environments that provide a feeling of presence (esp. via avatars) within such environments; whether depicting computer representations of the real world (e.g., in SL) or a realistic looking fantasy world (e.g., in WoW), one’s senses convey a feeling of being there, immersed within the virtual environment, along with some emotional attachment to and connection with one’s computer avatar. Such presence and emotion

⁴ Other information (e.g., “race”) is readily available too, and facilities exist to examine avatars’ capabilities (e.g., weapons, armor, skills) as well.

appear to differentiate virtual worlds such as SL and WoW from the other kinds of computer-mediated environments noted above.

Further, both of these virtual worlds are persistent and involve interaction between massive numbers of participants. Participants are free to look and move in whatever directions they choose, and they can undertake most activities at their convenience. Participants communicate directly with one another textually (with opportunities for voice communications as well) but can demonstrate many emotive behaviors (e.g., “body language”) via avatars as well. Participants’ real world identities are hidden within these virtual worlds, but they have unique in-world identities displayed prominently via pseudonyms, and reputation develops. These virtual worlds exhibit several forms of wealth with them, and they exhibit spillover effects—in both directions—with the real world.

Select instances of persistence, interaction, freedom, communication, anonymity, wealth or spillover can be identified in some of the e-mail, text messaging, web pages, social media sites, video games and like computer-mediated environments examined through this study also, but we do not observe them all converging together within any one of such environments. Such convergence appears to differentiate virtual worlds such as SL and WoW from the other kinds of computer-mediated environments well. Hence a relatively small set of potentially distinguishing characteristics of virtual worlds could include these three: 1) sensation of presence, 2) emotional connection, and 3) convergence of persistence, interaction, freedom, communication, anonymity, wealth and spillover within a single application. Testing for the relative presence and effect of such characteristics represents a fruitful topic for future research stemming from this investigation.

D. REAL WORLD ORGANIZATIONS

Our investigation identifies numerous real world organizations with noticeable presence within virtual worlds, particularly Second Life. Most of these are major corporations, government agencies and like, large organizations in the real world. They are clearly serious organizations (e.g., employing many people, large budgets, major economic impacts).

1. Additional Marketing Channels

Most real world organizations are using virtual worlds to extend their reach in terms of additional marketing channels. Examples include American Cancer Society [78], Best Buy [79], Cisco Systems [80], Dell Computers [81], Depot Consulting [82], H&R Block [83], International Business Machines [84], Reuters [85], Pontiac [86], Reebok [87], SUN Microsystems [88], the US Army [89], 20th Century Fox [90]. In such cases, organization takes place in the real world, and the virtual world represents simply an extension of the organization. No activities of organization per se take place within the virtual world, but there are some unique capabilities for marketing (e.g., virtual product exploration) enabled by the virtual environment.

2. Education and Training

Certain aspects of serious real world organizations conducting education and training are evident within virtual worlds also. Examples include Anglia Ruskin University [91], Harvard Law School [92], University of South Australia [93], University

of Wisconsin [94] and others [89]. The, US Air Force [95], Army [96], Marine Corps [97], and Navy [98] all employ virtual worlds for training as well. As above, organization takes place in the real world, and the virtual world represents simply an extension of the organization. No activities of organization per se take place within the virtual world, but there are some unique capabilities for education and training (e.g., learning about real world artifacts, systems and organizations through experimentation with their virtual counterparts) enabled by the virtual environment.

3. Many Other Examples

We also find many other examples, a hundred or more of which are included in the Appendix for reference.

4. Memoing and Reflection

In all, these examples suggest little difference between organizations in virtual worlds and their ubiquitous and very well-understood counterparts in the real world. Indeed, as noted above, no activities of organization per se take place within the virtual world, but there are some unique capabilities enabled by the virtual environment.

E. VIRTUAL WORLD ORGANIZATIONS

Our investigation also identifies aspects of organization within virtual worlds that do not have direct counterparts in the real world; that is, such aspects of organization exist solely within virtual worlds. We look first for instances of organization within virtual worlds that, although without direct counterparts beyond such virtual worlds, have analogs to instances of organization in the real world. We look then for instances of organization that appear to be unique to virtual worlds.

1. The Architect, Tailor and Club Owner

The architect, tailor and club owner that we meet and interact with in SL represent direct analogs to the kinds of architects, tailors and club owners that are commonplace in the real world. “VA” (pseudonym of the architect avatar’s in-world name⁵), for instance, designs and constructs virtual buildings (among other artifacts) within the SL environment, and he or she earns real world money for doing so. This is entirely consistent with the kind of work activities that real world architects perform.

Moreover, VA works with multiple people to accomplish such architecture work. Their virtual world “organization” is analogous to the kinds of professional architecture practices found in the real world, and monetary transactions to finance in-world architectural projects take place in the real world using real world currency. Although not nearly as large as the major corporate and government examples above (e.g., this is a “small business”), this is a serious organization providing for the livelihood of its participants, who work collectively toward common goals. The key difference: this architecture applies only to buildings and like artifacts that exist solely in the virtual world; such buildings and artifacts have no physical presence in the real world, and they can be seen and experienced only as computer renderings via 3D graphics.

This virtual world architect uses many real world terms to describe his virtual world organization (e.g., “my staff,” “work assignments,” “different skills”) that suggest

⁵ Although people’s real world identities are hidden via pseudonyms within the virtual worlds examined through this investigation, they are unique to such virtual worlds, and people develop unique, in-world identities and reputations that many consider to be important. To respect their privacy we do not report real in-world pseudonyms here.

aspects of structure, division of labor and like, familiar features of organization. Indeed, we can view this organization as a Simple Structure [20], which appears to fit the dynamic, entrepreneurial, one-client-at-a-time environment in which it operates as well as to leverage the unique technologies (e.g., 3D graphical rendering, SL scripting, in-world communicating) that support this architecture practice.

The tailor is similar to the architect above in terms of having clear, commonplace, real world analogs (i.e., tailors). “TT” designs and makes outfits for virtual world avatars to wear, and he or she exchanges such outfits for money. This is entirely consistent with the kind of work activities that real world tailors perform. As above with the architect, this tailor is different, however, for all of his or her work products exist solely within the virtual world; that is, all garments exist as graphically rendered 3D objects that can be worn only by computer avatars within a specific virtual world (i.e., SL).

In terms of virtual world organization, “TT” differs from the architect in that all transactions take place solely within the virtual world, and only in-world currency is exchanged. To purchase a “designer” suit, dress or other outfit, one exchanges in-world money via computer avatars. This is distinct from the architect, who exchanges real world money for virtual world services. As noted above, however, people can exchange real world money for in-world currency, and vice versa. Such interchangeability of virtual and real world currencies helps us to take seriously organizations that conduct business transactions via virtual money.

As with the architect, the tailor’s “organization” is not nearly as large as the major corporate and government examples above. Indeed, the tailor conforms well to one-person, part-time, entrepreneur analog in the real world, in that the man or woman (no way to tell) represented by the tailor avatar “TT” works alone in a relatively new capital venture. We can view aspects of serious organization in terms of exchanging services for money, but there are no employees to supervise or collective work to observe and report within the virtual world. Moreover, the small scale and part-time nature of the tailor’s in-world operation could suggest something more resembling a hobby than a profession.

The club owner is similar to the tailor in that only in-world money is exchanged for virtual world services. “CO” bought some virtual world land and constructed a virtual building, into which he or she can limit access to “paying customers,” who use in-world currency to gain admission. Inside this virtual building is a setting that conjures images of a real world dance club, with places to sit, mingle, order drinks, and dance of course. Once inside, people’s avatars can interact with any of these artifacts (e.g., sit in chairs, communicate with other people’s avatars, hold a beverage glass). Once one’s avatar is inside the virtual building, the user can hear popular music over real world computer speakers, and several scripts are available to enable one’s avatar to dance in different styles. Some scripts are provided complimentary by the club owner, but several people have apparently either developed or purchased their own, more advanced scripts, for the corresponding avatars dance in distinctive styles relative to most others.

The club owner is distinct from the architect and tailor in that he or she sells no “tangible” product. The club building and furnishings represent tangible artifacts within the virtual world, but participants do not keep them or gain exclusive access to them (cf. virtual buildings designed and constructed by the architect, virtual outfits designed and made by the tailor); they pay virtual world money for the club experience. This all

follows the real world club analog very clearly, and similar to the tailor, “CO” appears to be an entrepreneurial sole proprietor with no employees. The same comments pertaining to the tailor “organization” apply.

Several aspects of these three examples are similar to characteristics discussed above in terms of serious real world organizations with virtual world presence, but some differences are readily identifiable too. In terms of similarities, the architect, tailor and club owner have direct analogs in the real world, as do their products and services. Also, although much smaller than the major corporate and government examples above (e.g., the architect is analogous to a small business, the tailor and club owner are analogous to sole proprietorships), their approaches to virtual world commerce are easily recognizable and directly comparable to real world counterparts.

Key differences center on the observation that these latter examples have no direct counterparts in the real world. Unlike the major corporate and government examples above, the architect, tailor and club owner conduct business solely within a virtual world and are not part of a real world “parent” organization. Indeed, we find the inverse of the organizations above: activities of organization take place in the virtual world but not the real world. Also, their products and services are offered solely within the virtual world. Like real world counterparts, some (e.g., virtual buildings, virtual garments) reflect aspects of tangibility within a virtual world, whereas others (e.g., virtual club) are purely experiential via computer avatars.

Each of these three examples also represents a comparatively small (esp. with respect to the kinds of large corporate and government examples discussed above), entrepreneurial venture, ranging in scale from part-time hobby, through sole proprietorship, to full-time small business. This raises the question of what constitutes “serious organization” in virtual worlds. One could argue that an Internet hobby should not be considered serious in terms of organizational design. Alternatively, as noted in prior research, virtual worlds at present blur the lines between work and play [45], so it may be premature to assign such *etic* meaning.

Further, each of these examples represents a for-profit “business” in the sense that services are exchanged for money. However, only the architect has “employees,” so one can question whether the tailor or club owner even qualify as “organizations” (e.g., there is no collective, goal-oriented activity). Alternatively, many of the comparatively very large, major corporations in the real world today began—albeit years, decades and even centuries ago—as single-person, entrepreneurial ventures, two-person partnerships, and like-scale businesses with no employees at the time, so it may make sense to study such virtual world ventures despite their small size.

2. The Friends, Groups and Events

The friends, groups and events that we encounter in the virtual world represent direct analogs to the kinds of friends that people make, the kinds of groups that form around common interests, and the kinds of events that take place in the real world. As researchers on this project, we’ve made several friends with other virtual world participants through interactions via our computer avatars. We know their names (pseudonyms), where within the virtual world they like to go (e.g., Welcome Center, NASA, Loyalist College and what activities (e.g., “hanging out,” “meeting new people,” “exploring”) and conversational topics (e.g., “ragging on bosses,” “local night life [real

world],” “business”) they enjoy. We gain insight into their personalities, behavioral patterns, and intelligence and education levels through (mostly text-based) conversation. We enjoy interacting with some people’s avatars more than with others, and over time we adjust our behavior to spend more time with those we like and to avoid those we dislike.

We also use an in-world feature to “friend” one another, which expands our capabilities for locating and interacting with friends inside the virtual world. We set up “dates,” “rendezvous,” “appointments” and like mechanisms for meeting at pre-arranged places and times, and sometimes we “work” collectively in very small groups to participate together in specific in-world activities (e.g., concerts, meetings, “coffee”). These examples reveal some collective action toward partially shared goals, which suggest aspects of organization, albeit informal in nature and on a very small scale. Unlike the virtual world examples above, however, such collective action is not focused on commerce. Although some “professional networking” takes place through virtual world friendships, most of the friends we observe choose to not reveal their real world identities, and most of the friends we interact with participate for leisure. This causes us to question whether virtual world groups of friends constitute serious organization.

We get invited to join interest groups (e.g., aviation, virtual world design, sports) within the virtual world too. Unlike friendships, which tend to be dyadic, interest groups bring numerous people together to discuss common interests and to participate in common activities, and one’s avatar can belong to many groups; hence we see a many-to-many relation between groups and participants. Some interest groups center on large real world organizations that maintain a presence within the virtual world (e.g., NASA, Pontiac, SUN Microsystems). The investigator’s real world organization, for instance, maintains a presence within this virtual world and has members who organize and lead multiple interest groups along these lines. This is parallel to the kinds of major corporations and government organizations from above that use virtual worlds as a marketing channel. The key difference is that interests groups are not focused (at least directly) on commerce and profit; none of the interest groups observed requires a membership fee or dues for participation, for instance.

Other interest groups exist and operate solely in-world, without real world organizational sponsors, yet with real world analogs (e.g., Second Life Christians, Librarians of Second Life, Second Living Land Group). This is parallel to the kinds of virtual world businesses discussed above (e.g., architect, tailor, club owner) with analogs but no direct counterparts in the real world. Some groups are very large (e.g., hundreds of members), while others are quite small (e.g., only a few members). In either case, one or more leaders emerge to develop the (minimal) expertise needed to use the in-world feature to form a group, to organize the interest group activities, and to invite participants. One can argue that some interest groups reflect more aspects of organization than others do, and some groups suggest more serious organization than others do.

Many events take place within virtual worlds. The larger of such events (e.g., concerts, “conference” presentations, “town hall” meetings) tend to be coordinated by people working in teams or as extensions of real world organizations such as those described above, whereas their smaller counterparts (e.g., demonstrations, poetry readings, virtual building tours) seem to be organized more by single individuals (e.g., the person conducting the demonstration, reading the poetry, or leading the building

tour). As above, these parallel similarly the kinds of major corporations and government organizations in the real world with virtual world presence versus the kinds of virtual world businesses with analogs but no direct counterparts in the real world.

I attended an international “conference” on virtual world organizations that was set entirely within a virtual world, for instance, but this event was organized by a real world organization. Once I had the coordinates and schedule, I had my avatar don relatively formal attire (e.g., a tuxedo). I teleported my avatar then to the graphical rendering of an amphitheater, mingled and exchanged ideas with some of the other participants, had my avatar sit down in one of the virtual theater seats. While “seated,” I looked at a virtual screen with real (e.g., PowerPoint) slides being presented by an avatar standing at a virtual podium. I also listened to the real world speaker via an audio channel on my computer.

I happen to know that the conference organizer is located physically on the US East Coast, and I on the West Coast, in the real world, but physical location was irrelevant, and I met participants from around the world—all from my campus office. When the presentation that interested me most was over, and I had finished asking questions, I teleported “home,” logged off, and returned to work. Time passed in preparation for and participation in this virtual event just as it does for real world conference presentations, but place was irrelevant, and any distinction I would make ordinarily between the “real” and “virtual” seemed irrelevant also; the real and virtual worlds blended together into a familiar yet unique, relatively passive yet participative experience.

One of myriad events experienced, this one shares properties with most of the discussion above: there are clear real world analogs (e.g., conferences), the activities take place solely within the virtual world (e.g., the virtual ampitheater), people interact only via their computer avatars in graphically rendered 3D virtual environments, and some aspects of organization (e.g., conference preparation, collective participation in presentation sessions) are evident. Friends, groups and events in virtual worlds appear to be consistent with and similar to their real world counterparts in many ways, yet the activities of organization take place solely within virtual worlds.

3. The Guilds

The guilds that we encounter in virtual worlds share recognizable features with real world counterparts, but they elucidate several unique attributes as well. To help reveal and provide context for such unique attributes, we provide more detail regarding these virtual world observations than the ones described above.

Guild is an in-world term used commonly to describe relatively large groups (e.g., dozens to hundreds) of people’s avatars (e.g., one person can have multiple avatars) that adopt a collective affiliation (i.e., denoted by the guild name), communication channel (e.g., guild chat) and implied (if not express) obligation to work together in support of one another’s partially shared goals. For instance, many more experienced guild members are willing to spend time helping their less experienced counterparts progress quickly through challenging quests, whereas few others would be willing to do so. As another instance, most avatars have professions (e.g., mining, alchemy, jewel crafting) and offer services for fees (referred to as “tips”) to others; most guild members are willing to perform such services with no expectation of payment.

Guilds have officers (e.g., with power to admit, expel, promote and demote members), members of varying ranks and privileges, bank accounts, and other visible aspects of organization. Many guild members socialize together in-world (e.g., using a special communication channel for guild chat, via a real world voice channel called “vent”), and some are friends and colleagues in the real world, but most observable guild activity pertains to quests and like challenges within the virtual world. The guild is the most easily recognizable aspect of organization in the WoW virtual world.

Unlike the real world guilds of olden days (e.g., stone masons, leather workers, apothecaries) and unions of current times (e.g., autoworkers, teamsters, electrical workers), which are principally profession-based, guilds in this virtual world appear to be more like clubs, fraternities, church congregations, and like collectivities organized around common interests outside of professional occupation. Continuing with the professions example from above, a single guild of average size and diversity will generally have all of the eleven primary professions represented among its membership. Hence the guild does not organize around a single profession; it organizes instead around an in-world activity such as questing, raiding or simply socializing.

Participation in guilds is voluntary, but most avatars that we observe in-world reflect a guild affiliation (e.g., an avatar’s name, level, race and guild affiliation are visible readily to others). For instance, one interaction between avatars from two different guilds in a virtual world city could be observed readily by corresponding five labels (i.e., arranged as 1) avatar name, 2) avatar title, 3) experience level, 4) race and class, 5) guild affiliation) : “Crusher the Patient” (a “Level 80” “Dwarf Paladin”) of “The Defenders” guild⁶ was seen chatting publicly (i.e., the text was visible to all within range) with “Persistence of Exodar” (a “Level 72” “Human Hunter”) of “Keepers of Principle” guild.

Guild membership is relatively fluid, as people are free to quit at any time, and guild officers can expel avatars at any time, with or without cause. Although we observe many avatars switching guilds over time, most appear to stay with guilds for relatively long periods (e.g., months, years). During the period of this study, for instance, our primary avatar “MP” participated in three guilds. From Level 1 (XP) to 23, MP did not participate in a guild, opting to acculturate into and gain experience with this virtual world through lone questing the most part. MP was recruited to join Keepers of Principle at Level 23 and stayed with this guild through Level 80 (i.e., the maximum experience level at the time of this study). Our focus was on “leveling” this avatar (esp. gaining XP through quests), and the members of this guild (e.g., with many more experienced avatars) provided assistance (e.g., helping to accomplish particularly difficult quests) toward this end. Indeed, assisting lower level players with the leveling of their avatars (called “toons”) represents a recognized and commonly discussed, cultural aspect of this guild. “Let’s have a ‘help noobs level’ day each week,” for example, represents a recurring conversational theme discussed and followed up by these guild members.

Although Level 80 is the maximum experience level at the time of this study—and reaching this level is a cause for hearty group congratulations and celebration—this advanced level is only the beginning of a whole new set of activities reserved for Level 80 avatars. Indeed, even at Level 80, one finds his or her avatar to be comparatively very

⁶ As above, all pseudonyms.

weak and incapable with respect to the challenges confronting the Level 80 Community, and a new goal set beyond questing and leveling emerges.

“Gearing up,” for instance, pertains to acquiring more capable weapons and equipment for an avatar, most of which can be acquired only through group participation in “parties” and “raids.” Parties are relatively small teams of 2 – 5 (generally unassociated and randomly grouped) avatars that address the challenges of small “dungeons” together for 15 – 30 minutes before disbanding; we discuss this in greater detail below. Raids are relatively large teams of 10 – 40 (generally associated and deliberately grouped) avatars that address the challenges of large dungeons or battlegrounds together for several hours at a time, often multiple days each week, often over a period of many months; we discuss this in greater detail below also).

At Level 80, our guild’s focus became inconsistent with this emergent goal. Spending time assisting lower level players leaves little time for raiding and hence gearing up, for instance. Hence after a couple of months we quit, interviewed with several other guilds, and decided to join “Blemish the Opposition,” a guild comprised of relatively elite members (e.g., very well-gearred) who are committed to raiding for 3 – 4 hours every day of the week. A visible and common emphasis of this guild is “gearing up,” and acquiring ever better weapons and equipment represents the express reason for its participants to work collectively. As an elite guild comprised of very well-gearred avatars, its members can accomplish comparatively challenging feats through raids when compared to other guilds. Indeed, guild officers use the associated in-world reputation to recruit even more elite and better geared members. For instance, the Guild Master (i.e., highest level officer) states this as an explicit goal: “improve the guild’s reputation and recruit ever better members.”

As a relatively new and lesser geared “80” (i.e., Level 80 avatar), we find it difficult to perform as well as the elite avatars in this guild, and based on such performance differential, we are excluded from most raids. Even though our interview involved a visual gear examination, including a “gear score” calculation, by a guild officer, and we were asked several questions pertaining to our raid experience and performance level, our participation in this guild resembled sports tryouts, or a probationary period in professional employment, during which we were evaluated. “Trial Raider” is the official guild title placed on new recruits such as our MP avatar, and techniques for measuring various aspects of raid efficacy (e.g., how many times one’s avatar dies, how much damage to adversaries one causes, how frequently adverse actions cause harm to other raid members) are used to scrutinize their performance. “Your DPS [damage per second] is too low,” for instance, is a comment that we received from a guild officer after inquiring about our raid performance on the first day. (Ironically, the principal path to increasing DPS is through raiding.) “We’ll let you come along again today, but you need to perform better,” as another instance, is a comment that we received from a different guild officer before a raid the next day. Although we were not expelled from this guild, we were not allowed to raid with it—and hence not pursue our goal of gearing up—and so searched for and found another after interviewing and trying out with multiple alternate guilds over a period of several weeks.

“Reward or Punishment” is a guild that strikes a balance between the identities, cultures and behaviors of the two discussed above. The guild has dedicated raid teams,

with members eager to acquire improved gear, but they raid only once or twice weekly, and the performance of each team as a whole is emphasized instead of scrutinizing the performance of individual members. Many guild members express and demonstrate a willingness to help others, but all members are expected to conduct outside research (e.g., of gear alternatives, raid tactics, team mechanics) to prepare their avatars to perform effectively, and implied social norms include effective raiding over time (esp. not repeating the same mistakes). This guild appears to provide a good fit with the level, gearing and goals of our level 80 avatar.

Such fit doesn't apply to all, however. A conversation with an avatar that had belonged to this guild provides an example. "RR" revealed to us one day that this guild is not "serious about raiding." After participating with Reward or Punishment for a relatively long period of time, RR decided to quit and join "Relativity," a guild more like Blemish the Opposition. Compared with our own experiences with the other two guilds described above, this suggests that different guilds with different foci may provide comparatively different degrees of fit with the goals and experience levels of different avatars at different times of their progression through this virtual world.

Guilds reflect in-world organizations, through which users' avatars join together in multiple, goal-oriented, collective activities (esp. questing, raiding, socializing). They reveal noticeable hierarchy and rank-based status differences regarding formal guild activities (e.g., recruiting, promoting, demoting and expelling members), and they help set and maintain the cultural tone, principally through recruiting. However, guild officers have no special privilege or power regarding the organization of parties and raids, decisions to assist less experienced players, or social events. Rather, individual players organize themselves into groups of various sizes and compositions to accomplish such goals. A guild in this virtual world has no counterpart in the real world, but it reflects several familiar characteristics of real world organizations.

4. The Parties

The parties that we encounter in virtual worlds share recognizable features with real world counterparts, but they elucidate several unique attributes as well. As with guilds, to help reveal and provide context for such unique attributes, we provide more detail regarding these virtual world observations than the ones described above.

As noted above, *party* is an in-world term used commonly to describe a relatively small team of 2 – 5 avatars that addresses the challenge of a group quest or small "dungeon" together. Although the majority of quests can be accomplished individually by avatars at the appropriate experience levels (e.g., higher level avatars are able to accomplish more challenging quests), many require one's avatar to team temporarily with others to complete them. There is no systematic mechanism for recruiting others to join such temporary teams, hence most parties form impromptu and *in situ*, by whichever avatars in visible range happen to be attempting a particular quest at the time. We observe and participate in many such temporary teams, most of which disband immediately after completing each group quest (e.g., after a period of 5 – 15 minutes).

Nonetheless, oftentimes we would add particularly helpful and thoughtful avatars to our "friends" (i.e., an in-world feature that alerts you whenever a friend comes into or leaves the virtual world and that lists the avatar's in-world location), and such friends represent a pool of potential teammates to call upon for future group quests. Other times

we observe parties of avatars played by people who appear to know one another in the real world (e.g., real world friends with in-world avatars that team together). Their conversations reveal numerous real world husband-wife, boyfriend-girlfriend, mother/father-son/daughter and like teams, for instance, of avatars in parties representing people with close personal relationships in the real world. Some friends last only briefly (e.g., for a single quest), while others last a virtual lifetime (i.e., as long as people participate in a particular virtual world), and many people in guilds begin their in-world acquaintances as friends. Friending and teaming represent important and pervasive aspects of collective, goal-oriented activity in this virtual world.

Parties also organize to accomplish the challenges of dungeons together. *Dungeon* or *instance* is a term used to describe areas of the virtual world with clearly delineated entrances and exits and dedicated challenges (esp. high-level, computer-controlled adversarial avatars; only one party at a time participates in a specific dungeon instance) that can be accomplished only by *organized* teams of avatars. This provides a contrast with the kinds of quest parties described above, which form impromptu and *in situ* by whichever avatars happen to be visible in a particular quest area at the time. Avatars in dungeon parties are expected to work together in teams of five and to play specific, pre-selected roles. This is in addition to the coordinated and time-critical actions required by each user regarding his or her avatar (i.e., characterized above in terms of a small staff of people or squad of soldiers); such coordinated and time-critical actions by each user must be integrated and coordinated with those of four other people and avatars.

Specifically, for instance, one team member participates generally as *tank* and is expected to engage and draw the hostility of dungeon adversaries; this role requires specialized gear, experience and disposition to draw hostility from and absorb the attacks by dungeon adversaries without dying. Many of the 50+ actions, movements and capabilities required of a tank are unique to that role and must be coordinated with those of the other party members. As another specific instance, one team member participates generally as *healer* and is expected to use special abilities to keep the tank and other party members alive; this role requires a different complement of specialized gear, experience and disposition, and as with the tank, many of the different, 50+ actions, movements and capabilities required of a healer are unique to that role and must be coordinated with those of the other party members. As a final instance, three team members participate generally as *damage* or *DPS* and are expected to attack and defeat dungeon adversaries; this role requires yet a different complement of specialized gear, experience and disposition, and as with the roles above, many of the different, 50+ actions, movements and capabilities required of a DPS are unique to that role and must be coordinated with those of the other party members.

Indeed, failure or inadequate performance—in one's specific role—by any one team member of a party can cause a *wipe* (i.e., where all avatars die in the dungeon) and lead to failure. Each role requires considerable practice to master, and performing well with others in their specific roles requires substantial experience as well. This is particularly important in dungeons, for most people in dungeon parties have never participated together previously; that is, people must learn very quickly to work together in a dungeon party through their avatars and pre-assigned roles.

Although a party member can self-select the moniker “Dungeon Guide” to signal that the avatar’s user has what he or she believes to represent substantial experience with dungeons, such moniker confers no special leadership privilege or authority. No one is in charge of a party: its organization is completely flat. Party leadership does emerge, nonetheless, generally through a combination of party chat communication and effective action. Many dungeons, for instance, permit many different paths to be taken through them. Although party members are not compelled to all take the same paths, most parties will wipe unless they do so, and a visible leader (e.g., the tank) emerges naturally as the avatar being followed by the others.

Another visible manifestation of emergent leadership is reflected in party chat communication. For instance, it is common for someone to use party chat to challenge the tank’s choice of path and timing or technique for engaging dungeon adversaries, or for the tank to critique other players’ performance. This is the case in particular when the party is experiencing difficulties as they encounter dungeon adversaries. Comments sent via a specific party text chat channel tend to be terse and negative (e.g., “you retard, why did you pull?” “you !@#\$ing dork, don’t you know how to tank?” “why don’t you try healing instead of admiring your toon’s butt?”), reflecting in large measure frustration that can develop among five participants that have never worked together before. Encouraging and complimentary comments (e.g., “nice healing”; “good job tank”; “great dps”) are observed as well, however, albeit much less frequently.

Other party members may join in the conversation (e.g., confirming the challenge, supporting the tank, offering a different view) or ignore it, and consensus may or may not result. In cases of conflict that extend beyond lack of consensus, party members are observed using an in-world capability to eject any avatar by popular vote, and some party member are observed leaving the team in the middle of a dungeon. Most dungeon parties stay together through completion of all activities (with periodic wipes), however, and then disband. In the end, unless all party members work together effectively as a team—through consensus or not—they will most likely fail and wipe.

The leadership and organization that emerge in a dungeon do so impromptu, in real-time. With each individual user coordinating the 50+ time-critical actions of his or her avatar as outlined above (e.g., enacting a different activity every second or two), coordinating the combined, goal-directed, 250+ activities performed by five avatars in a party requires considerable, collective, time-sensitive and goal-directed organization. A noticeable skill reflected by players with considerable dungeon experience pertains to their ability to adjust quickly to the composition of each specific party (esp. class, specification, gear) and to complement well the idiosyncrasies of the particular avatars in a party (esp. visible skills, tactics and styles).

Recreational “pick up” basketball and soccer games (e.g., where most players have never played together before) in the real world share some common characteristics of parties in this virtual world; in addition to a player’s skill and experience with the sport itself, some people learn to work well and quickly with other, unfamiliar players. Through our experience in this virtual world, this skill develops in large part through repeated experience with learning to work well and quickly with other, unfamiliar players. To the extent that serious organizations maintain relatively stable work teams over time, such skill is likely to have negligible relevance, but where serious

organizations—in the real world or a virtual world—center on many temporary teams that form quickly and disband shortly afterward, this skill elucidates considerable applicability.

5. The Raids

The raids that we encounter in virtual worlds share recognizable features with real world counterparts too, and they elucidate several unique attributes as well. As with guilds and parties, to help reveal and provide context for such unique attributes, we provide more detail regarding these virtual world observations than the ones described above.

As noted above, *raid* is an in-world term used commonly to describe a relatively large team of 10 – 40 avatars that addresses the challenge of a large dungeon or battleground together. Large dungeons are similar in many respects to their smaller counterparts, but the computer-controlled dungeon adversaries tend to be much, much more powerful, hence requiring a comparatively large team. Battlegrounds are similar, but adversaries are comprised of other players’ avatars instead of computer-controlled characters; hence battle grounds involve player-versus-player interaction. Although we participate in numerous battleground events, they comprise a small part of our virtual world experience, and we do not discuss them further here.

Unlike their smaller, five-player counterparts, large dungeon raids involve considerably more avatars and require greater coordination. In many cases, the required degree of coordination exceeds the ability of randomly teamed players to demonstrate effectively. Although the same three, primary dungeon roles (i.e., *tank*, *healer*, *damage*) are played and remain key to raids, the greater challenges, larger teams and more powerful adversaries associated with large dungeons require many subtle variations and combinations based on avatars’ specific races (e.g., Dwarf, Elf, Human), classes (e.g., Paladin, Priest, Hunter) and specifications (e.g., Protection, Holy, Marksman). As with parties above, each of the, say 25, avatars in a raid has 50+ time-critical actions for the user to coordinate, and all of the avatars must organize their goal-directed activities effectively.

Some raid conditions permit coordination through division of tasks (e.g., Tank A attacks Adversary X, and Tank B attacks any others that emerge; Healer C concentrates on keeping Tank A alive, and Healer D emphasizes the other raid members; melee DPS attack the boss in support of Tank A, and ranged DPS attack “adds” in support of Tank B). In these cases, the complexity of avatars’ collective activities does not appear to be much greater than in dungeon parties. There are more avatars, but the divisibility of their tasks does not appear to increase the coordination load proportionately.

Alternatively, other raids involve reciprocal interdependence and complex, time-critical interaction between avatars playing each role (e.g., Tanks A and B must both engage the Adversary X at the same time but alternate at key times in terms of elevating or mollifying their aggression levels; Healers C and D must decide promptly and based on exigent conditions which one will respond to specific issues that emerge; melee DPS must attack the boss while observing the progress of their ranged counterparts and assisting when necessary, and vice versa). In these cases, the complexity of avatars’ collective activities appears to be noticeably much greater than in dungeon parties. There are more avatars as above, but their tasks are indivisible and entail high coordination

load. One avatar, making one mistake, at one point in time, can cause the entire raid team to wipe in many raid instances.

Even with voice communication overlaid on raid text chat, coordination in such latter raids is too difficult for most random teams to accomplish effectively. For this reason, a great many raid teams are composed from guild avatars and reflect relatively consistent membership over time. We participate on three raid teams through our guild, each with consistent and overlapping membership, and we note steady performance improvement of each raid team as we repeat raids and learn to work together as teams. One raid instance, for example, includes a dozen “bosses” (i.e., particularly challenging adversaries) that can be engaged only after defeating myriad challenges and groups of capable but lesser adversaries. Most such bosses must be engaged linearly (e.g., Boss 1 must be defeated before Boss 2 can be engaged); hence we note our steady raid team progress by the number of bosses that we are able to defeat during a night’s raid (e.g., over a period of three hours). When someone on our regular raid team for this instance is absent, and we are forced to include an unfamiliar player, our performance suffers often. Indeed, providing consistent raid team membership and raid opportunities represents a primary function of guilds in this virtual world.

Another approach to forming raid teams is through pick-up groups (“PUGs”) advertised via text channels in major cities. A PUG organizer has considerable experience generally with the specific dungeon raid being organized, experience which includes knowledge of how the many avatars playing specific roles should be included to compose an effective raid team. When forming a raid PUG, the raid organizer receives generally many text responses to advertisements, often including postings of avatars’ classes, specifications, gear scores (i.e., a rough quantitative measure of gear capability, used as a proxy for skill and experience), achievements (e.g., via an in-world mechanism for recording sharing evidence of the various raids that an avatar has completed successfully) and specific roles (i.e., *off tank*, *raid healer*, *ranged dps*) that can be performed. Many PUG organizers will interview potential raid members to ask about their experience and visually “inspect” their gear to gauge their capability level and fit in terms of the composition of the raid team and demands of the dungeon. Acceptable avatars are “invited” to join the raid team. A comparatively very small number of PUG raids that we participate in are as effective as those of our guild teams, but such raids are exceptional and rare.

Raid teams, whether composed of guild members or PUGs, have an avatar with the title “Raid Leader.” The corresponding player generally sets up the raid, recruits team members and distributes “loot.” These are all sources of power. Unless someone takes the time to set up a raid, participants cannot engage in the associated raid experience; likewise unless someone is invited to participate on a raid team. Power is even more visible in terms of loot distribution though. Raid participants share small rewards (e.g., in-world currency can be looted from many fallen adversaries) equally for the most part, but the most highly prized rewards (esp. gear) are distributed by the Raid Leader. Looting ever more capable gear represents a principal motivation for participating in raids (e.g., such gear enables an avatar to perform better in raid dungeons and equips it to participate in more challenging instances), so the player controlling loot distribution controls

pecuniary rewards. As noted above, an avatar's gear represents a visible signal of in-world wealth and status.

However, the Raid Leader is not always the one leading raid planning sessions and calling out tactical instructions during boss engagements. "Let the Tank get aggro." "Tank the Boss away from the raid." "Run out of the group now." "Everyone on the Green Ooze." "Ranged hit the Orange Ooze." "Melee help down the Orange Ooze now." "Melee stay out of the Green Slime!" "Everyone back on the Boss." These are examples of real-time, tactical commands issued during raids. Many times one or more pre-assigned "Raid Assistants" will take on this responsibility, but on just as many or more times one or more players will begin contributing toward such ends spontaneously. Here the players leading a planning discussion or tactical engagement will emerge to share their knowledge or express their opinions (e.g., through raid chat or a voice channel) and then resume their normal, non-leader activities. Such players tend to be very experienced and to sense some inadequacy with the official leadership at these specific times. Some official raid leaders are receptive to emergent leadership and input along these lines, and others quash the efforts.

Different team behaviors, group norms and cultural characteristics become readily apparent through raids and appear to vary considerably across raid teams. In our experience, raid teams comprised of guild members tend to work together repeatedly, and organizational learning becomes evident through comparatively smoother group coordination and mechanics, but the efficacy of raid teams from different guilds varies dramatically. Some raid teams appear to be very patient with members that make mistakes, whereas others express disgust with errors and even expel members who make mistakes repeatedly.

Similarly, some raid teams are content with in-dungeon learning from direct experience, whereas others expect for all members to conduct outside (i.e., real world) research to learn about expected dungeon events (e.g., capabilities and attacks of different adversaries, timing and sequencing of attacks by various adversaries, dungeon phases and critical events) and effective avatar activities (esp. which adversary to attack when and with what weapons, required coordinated movements, actions to avoid at particular times and following specific events).

Moreover, some raid teams use text and voice communication channels to socialize with one another and for entertainment, whereas others enforce strict "vent silence," keeping communication channels clear for Raid Leader instructions and calls for assistance from various team members. Strong norming activities (esp. via public text and voice comments, but including the "kicking" of nonconforming team members from a raid team and not inviting members to participate in future raids), and avatars develop reputations (e.g., "strong player," "noob," "retard") that extend well beyond a specific raid team (e.g., through a guild, into the community of avatars forming PUGs, across the general population of avatars playing the game).

Raids represent some of the most demanding collective endeavors encountered in this virtual world. The coordinated activities of 25 avatars—each with 50+ context-specific and time-sensitive activities in addition to moving responsively and sharing reciprocally interdependent responsibilities with others—in a challenging raid instance require considerable organization to accomplish effectively. Leadership is shared across

several noticeable dimensions in raids, with some de-jure leaders pre-assigned (e.g., Raid Leader, Raid Assistant) and some de-facto leaders emerging (esp. during planning sessions and tactically challenging events) at specific times. De-jure and de-facto leaders learn quickly how and when to share leadership during a raid. To the extent that serious organizations in the real world experience no need for emergent leadership, learning along these lines offers negligible potential, but where serious organizations—in the real world or a virtual world—encounter circumstances calling for experience-based leadership to emerge at critical times, this kind of learning elucidates considerable applicability.

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IV. DISCUSSION

Seven important themes emerge from the qualitative field data summarized above. First, we find several examples of serious organizations in virtual worlds. Most such examples involve real world organizations establishing and maintaining presence in virtual worlds, in something resembling separate marketing channels. These organizations commit substantial real world resources to their virtual world presence, and they expect positive returns from their investments. We also find serious organizations conducting business and performing other activities (e.g., charity) solely within virtual worlds (e.g., selling virtual artifacts), but the benefits of such business and other activities manifest themselves through real world money. These organizations succeed or fail based on the revenue they can earn through virtual world products and services.

In some contrast, we find still other organizations that exist solely in virtual worlds but that do not conduct business or perform other activities for real world gain. Most such organizations resemble clubs and hobby groups more than the kinds of organizations noted above, and for this reason one may hesitate to label them as “serious.” However, many people find the activities in such virtual worlds to be as or more challenging, important and emotionally compelling as their real world activities, and most people invest amounts of time comparable to part-time employment participating in the alternate realities. One may be compelled to accept that organizations in virtual worlds are serious to their participants despite their small size.

Moreover, virtual worlds represent a relatively recent phenomenon, certainly with respect to the length of time that real world corporations and like serious organizations have been in existence. Throughout long periods of human history, most organizations remained small, craftsmen allied themselves through guilds, and even larger organizations were comprised largely of familiar people from the same villages, families, tribes and like groups. Even most large, modern corporations in business today have been operating for decades but not centuries. Given substantial time (e.g., several decades), the small organizations found today in virtual worlds may grow and become increasingly powerful, influential and arguably “serious.”

Second, many virtual worlds are distinct from their real world counterparts but with considerable spillover between them. When participating in SL or WoW, for instance, one is not participating in real world activities at the local bowling alley, restaurant or mall, and artifacts (e.g., virtual land, virtual buildings, avatar weapons and gear) accumulated in virtual worlds have no utility in the real world. Users can become engrossed in virtual worlds, and many report taking on different identities and personalities when participating in such worlds. Many virtual worlds have their own systems of currency and other indicators of wealth, and people’s reputations in virtual worlds—due principally to anonymity—are restricted to these alternate, computer-rendered realities.

However, when people participate in virtual worlds instead of real world local bowling alleys, restaurants and malls, such real world organizations lose revenue. Where the population of virtual worlds remains in the tens of millions, such revenue loss may not be substantial, but if the population were to grow, say tenfold, then the demographics

of business could shift dramatically. People also exchange virtual world currencies for real world counterparts, and vice versa, and many real world services apply to virtual worlds, and vice versa. Hence the *channel* metaphor appears to fit virtual worlds well; they are separate from but related relatively closely to many aspects of the real world.

Third, many familiar aspects of organization in the real world are readily visible in virtual worlds. As noted above, we observe real world organizations with direct presence in virtual worlds, and we observe virtual world organizations with products and services in the real world. Many of the organizations found in virtual worlds, although distinct from real world counterparts, are even named as “special interest groups,” “friends,” “communities,” “guilds” and like monikers taken directly from the real world. Indeed, a great many organizations in virtual worlds are designed to look and behave very similarly to those in the real world, essentially patterned after real world counterparts. We find examples of hierarchy, division of labor, roles, compensation, specialization and other aspects of organization in virtual worlds as well.

Alternatively, albeit on a small scale, many organizations in virtual worlds appear to form spontaneously, and people organizing their collective, goal-oriented activities do so very often only for short periods of time. This virtual world phenomenon compares well with pick-up basketball and soccer games, virtual organizations and like, temporary organizations. Even in massive multiplayer online games, where collective activities may focus on killing monsters and like shared goals with no direct real world counterparts, such activities resemble those undertaken by militaries, police forces, gangs, vigilante groups and like, violence-oriented organizations routinely, as well as contact-oriented sports teams (e.g., football, hockey, rugby). This is the case in particular with player-vs-player combat.

Fourth, organizational learning is abundant, frequent and readily apparent in virtual worlds. Stemming largely from the impromptu formation and temporary existence of myriad organizations in virtual worlds, participants must learn to coordinate their activities with a new set of players and avatars on every occasion. This is the case in particular in online games where avatars are required to cooperate via parties and raids. We observe many players who appear to be very skilled at evaluating others avatars’ capabilities quickly and adjusting their own behavior to complement or compensate. Organizational learning in terms of norms and culture is abundant too, particularly in the various guilds observed, as new members are socialized into such organizations, and raid teams learn to work more effectively in dungeons, as two instances.

Organizational learning takes place commonly in the real world also, of course, and none of the observations above appears to be unique to virtual worlds. Nonetheless, the frequency, pace and pervasiveness of organizational learning in virtual worlds can be viewed as distinct, again due to the impromptu formation and temporary existence of myriad organizations in virtual worlds. As real world organizations strive to become more flexible, adaptable and ambidextrous [99-101], for instance, there may be lessons that can be learned from virtual world organizations—precisely because of the frequency, pace and pervasiveness of organizational learning therein.

Fifth, rapid and frequent organizational reconfiguration is prevalent in virtual worlds. This phenomenon complements, contributes to, and requires the organizational learning discussed above. Using dungeon parties as a suitable instance, it is very rare for

any two dungeon parties to be comprised of the same participants; hence every team must configure itself quickly around the specific avatars, experience levels, gear and capabilities involved and to address the specific challenges posed by the environments and adversaries corresponding to each particular dungeon. Here we see Contingency Theory and fit quite vividly: although the basic roles (i.e., *Tank*, *Healer*, *DPS*) are constant across dungeon parties, such parties are leaderless and lack formal organization, and the specifics of goal-oriented, collective activity must be worked out—generally in real-time—on each occasion.

Large dungeon raids provide even more visible evidence of organizational reconfiguration. We observe frequent and regular role and member replacement following dungeon wipes, for instance, as raid teams alter their composition, capabilities and characteristics, and as they adjust to different dungeon mechanics; from our observational perspective, they are reconfiguring their raid organizations to improve fit. Further, although large dungeon raids have the titular “Raid Leader” who organizes them and establishes the configuration largely through recruitment, leadership emerges often, as other people—particularly those with more experience of possibly more effective leadership skills—will take over in terms of directing and coordinating the planning and tactical activities of raid teams.

Indeed, the generally, nearly flat organizational structure of raid teams encourages such emergent leadership, and although some raid leaders are observed resisting such usurping of what they must view as their *de jure* authority, when raid members follow emergent leaders’ directions and even tell the raid leader to stay quiet, this “voice voting” aspect of leadership and followership facilitate rapid leadership changes. It remains unclear on what organizational scale these phenomenon could be maintained (e.g., even large raids have only 40 members), but with each participant coordinating 50+ individual avatar activities and reflecting several aspects of supervision, one could think of these as small- to medium-size organizations (e.g., consider 40 avatars x 50 activities to coordinate = 2000 coordination units). As technology continues to increase in terms of virtual world capability, many large raid teams and like organizations may emerge as well. Rapid and frequent organizational reconfiguration in such virtual worlds offer potential to inform the design of serious organizations in the real world.

Sixth, Contingency Theory appears to apply well to organization in virtual worlds. Real world organizations that establish and maintain presence in virtual worlds represent clear manifestations of adjusting organizational configuration (e.g., “geographical” organization to address specific markets) based on the environment and technology contingencies associated with virtual worlds (e.g., new marketing channels and opportunities). Virtual world organizations that tailor their divisions of labor, degrees of specialization, strategies, degrees of centralization and formalization, and like aspects of organization to the demands of virtual business environments represent clear manifestations also.

Even special interest groups can be observed to adjust their organizational configurations and behaviors to attract and maintain participants that are unique to virtual worlds in many respects. Similarly, in-world guilds, parties and raid maintain very flat organizational structures, egalitarian distribution of rewards, and opportunities for emergent leadership as well, all arguably in response to the demands of their virtual

world environments, technologies, strategies and participants. Indeed, we find no evidence to suggest that Contingency Theory fail to apply well in virtual worlds.

Finally, interface capabilities of virtual worlds enable classes of avatar movement and perspective that are unavailable at present in the real world. We mention teleportation, temporary death, and multiple simultaneous presence above as examples of virtual world phenomena that make participation in them somewhat unique from that in their real world counterparts. Such phenomena may merit serious study in terms of real world organizational design. With teleportation, for instance, “physical geography” in a virtual world become irrelevant; one’s avatar can teleport to any in-world location almost instantaneously. Everyday real world artifacts such as telephones, e-mail, video conference equipment and like communication media enable similar capabilities today, and the increasing sophistication of robotic devices (e.g., remote bomb disposal, distributed surgery, computer-controlled machining) reflects avatars’ ability to perform actions across distances also.

As noted above, however, the level of engrossment, emotional commitment and avatar identification corresponding to virtual world participation—in addition to participants’ willingness to pay for participation—suggest a qualitatively different set of media for communication and action. As real world organizations may adopt more virtual world interface capabilities, they may find novel uses for them—uses that may lead to organizational design changes in order to improve fit—and hence co-opt or usurp such interface capabilities for serious, real world organizations. Where executives in charge of a particular client organization, for instance, participate extensively in virtual worlds (e.g., in their spare time), they may react favorably to an advertising, consulting, engineering or like firm that conducts client business meetings via avatars that teleport to and from virtual meeting rooms. If teams of surgeons from around the world, as another instance, organize to form a virtual hospital that involves only remote, computer-enhanced surgery and are able to improve patient results dramatically, they may be able to establish a basis for competitive advantage from their technology enabled organization.

Further, the ability of in-world avatars to achieve near-whole-world perspective appears to be unique to virtual worlds yet applicable to the real world. Many avatars are able to support a first-person view (i.e., as though looking directly through the eyes of an avatar) as well as one or more third-person perspectives (i.e., as though looking at the avatar from beyond). The first-person view is most comparable to how people in the real world view it as individuals, and the third-person perspectives are comparable to how people in the real world view activities in movies.

The key to the latter perspective is that a user controls his or her view directly (cf. watching through whatever perspective a movie director dictates). Consider an Army general able to represent him or herself as a 10,000 foot tall avatar overseeing a battlefield, capable of “bending down” to view the specific activities of any group or “jumping up” to observe the flight patterns of individual aircraft in the area (all from his or her office on a different continent). Such general may have the capability to organize the troops and other combat resources differently based on such perspective.

Consider likewise business employees who conduct all business activities and communications in virtual worlds, and who can simultaneously sit in every other employee’s office to oversee what they are doing and overhear what they are saying.

Despite whether one would prefer such arrangement or not, employees in an organization equipped along these lines may be able to organize and coordinate their goal-oriented activities differently based upon this capability, and perhaps enhance organizational fit as a result.

Consider further an organization that embeds its key activities into a virtual world “game,” complete with “quests” that accomplish useful activities in the real world. Such a game may be so compelling that people participate willingly, actively and effectively for long periods of time, perhaps without pecuniary compensation—or possibly even paying for the privilege of participating. Like the Army general and business employees discussed above, we do not find any evidence of this example today, but they are all sufficiently close to examples of other organizations and collective, goal-oriented activities that we do observe that it does not require much imagination to notice the connection and consider seriously the possibility and potential. This opens up the possibility of designing serious organizations differently, using Contingency Theory, in virtual worlds.

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IV. CONCLUSION

Organization Contingency Theory has served us well for more than half a century. It enjoys abundant empirical support and guides organizational design and change across a broad diversity of contingencies, in terms of command and control as well as organization and management. Through a combination of research and practice we understand how organizations are designed to fit their environments, technologies and other contingencies individually as well as simultaneously.

An emerging phenomenon is straining this understanding, however, as new organizations are spawning wholly within virtual worlds. Here the organization and its environment exist solely within technological artifacts. This raises an important organizational design question regarding the fit of such organizations with their virtual environments and corresponding technologies. From one perspective, we can argue that virtual worlds are not important beyond recreation and game playing, that textbook principles of Contingency Theory and organizational design apply to virtual worlds directly, and that our extant understanding of telework, electronic commerce, network-centric operations, and virtual organization is sufficient.

From an alternate perspective, many serious organizations are emerging within such worlds, worlds which have few physical constraints. Also, advances in graphics technology and cinematic engagement enable unparalleled levels of immersiveness that can induce sustained psychological engrossment in virtual worlds, along with time investments and emotional commitments comparable to or exceeding those associated with physical organizations.

As part of a continuing initiative on command and control (C2) in virtual environments, the research described in this article takes neither perspective but uses Contingency Theory to understand organization in virtual worlds. We undertake immersive ethnographic research to study organization in virtual worlds, and we encounter many, diverse aspects of organization. Some aspects reflect directly real world organizations that maintain a presence within virtual worlds, and others are symmetric but do not have direct real world counterparts.

Several, intriguing new insights into Contingency Theory and organizational design emerge through this investigation. First and possibly foremost, Contingency Theory appears to apply very well to organization in virtual worlds. The robust contingency theoretic knowledge that has served well in the real world for more than half a century offers excellent potential to continue serving well in virtual worlds as well. Given the many unique qualities and characteristics of virtual worlds noted above, and the dearth of intensive organizational research focused on such virtual worlds, this represents an important contribution of the present investigation.

We understand that there is much to learn about the unique aspects and idiosyncrasies of organization in virtual worlds—in particular, given that many contingencies exist solely within virtual worlds and lack real world counterparts—but we gain the confidence of knowing that Contingency Theory can guide and help organize such learning. For instance, contingencies such as *environment* and *technology*, which are long-studied and well-understood in terms of real world organizations, have different

characteristics (e.g., existing solely within a computer rendering, centered on virtual artifacts) in the context of virtual organizations. Hence contingencies such as these—that have proven to be important in the real world—represent opportune areas to begin investigating through follow-on research on organization in virtual worlds.

Second, temporary organization, emergent leadership, fluid membership, dynamic structure, egalitarian distribution of rewards, rapid organizational learning and reconfiguration: these all surface as common and important characteristics of organization in virtual worlds. This imposes some strain on our current understanding of Contingency Theory. Organization in virtual worlds appears to be highly dynamic, and hence the nature of contingent fit must necessarily be dynamic as well. However, the predominate focus of Contingency Theory has concentrated on static fit through the decades, and our extant understanding does not address dynamic fit well [102]. Because dynamics of organization are so prevalent and important within virtual worlds, such worlds represent particularly appropriate foci for organizational research to learn about dynamic organization and apply the results to organizing more dynamically in the real world. This insight into Contingency Theory provides another contribution and elucidates a very rich topic for future organizational research as well.

Further, we begin to outline a framework for understanding how and where C2 can be enhanced through immersion in virtual worlds. Such framework remains vague and obscure at present, however, as we are only just beginning this stream of research, but consider the example of the battlefield commander from above. The situational awareness available to a commander through virtual world representation may exceed that enabled by the whole suite of sophisticated C2 tools employed by commanders today.

Moreover, consider also the example from above of embedding real world activities into virtual world “games,” in ways that make them engrossing and even addictive, such that people would be willing to “work” without compensation or even pay their employers for the privilege of “playing” these games that produce real world outcomes. Where an action in a virtual world may lead to a bomb destroying a real world building, for instance, or exposing the identity and location of a real world terrorist, as another instance, or even seeing the real world through the eyes of a weary and sleep-deprived soldier on the battlefield, as a third instance, such potential uses of virtual worlds for real world C2 are exciting. It may become even more difficult to discern “recreation” and “play” in such virtual worlds from “jobs” and “work” in the corresponding real world. Elucidating and articulating insights such as these highlight a third contribution from the present investigation, and insights along these lines offer potential for direct practical application as well as continued research along these lines.

Finally, it is important to reconsider the demographics of virtual world participants. We note above how such participants are diverse and span many generations, but the average participant is in his or her late twenties or early thirties and spends 20 to 30 hours weekly in virtual worlds. These are not just kids playing games after school. Most importantly, people in their twenties and thirties today will be in their forties and fifties in two decades. This represents the age range during which people begin obtaining positions of considerable responsibility in most real world organizations. Hence many of our organizational leaders of tomorrow are comprised of virtual world

participants today. Through research along the lines of this investigation, we are beginning to understand how we may be able to organize in contingency-fitting ways through virtual worlds, and such organization may complement the leadership, managerial and work practices of tomorrow's leaders better than simple linear extensions of today's organizations do.

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APPENDIX

This appendix lists select, serious organizations with presence in Second Life. This large but clearly incomplete list draws directly from [103], [104] and [105]. It is presented in no particular order. Please refer to these references for more information.

- Aimee Weber Studio
- Anshe Chung Studios
- Exakt – Made in Sweden
- Second Life Left Unity
- The Electric Sheep Company
- World Stock Exchange
- 20th Century Fox
- ABN AMRO Bank
- Adidas Reebok
- American Apparel
- American Cancer Society
- Avnet, Inc.
- Axel Springer AG
- BBC Radio 1
- Bigpond
- Centric
- Cisco
- Colonius Colonius
- Creative Commons
- Crescendo Design
- Dell
- depo consulting ltd
- Disney
- Beatenetworks
- Endemol
- Enel
- Ducati
- Eudoxa
- Faber Maunsell
- Forward Together
- Gabetti Property Solutions
- Graphico
- Hard To Find

- Harvard Law School
- IBM
- Imperial College London
- ING Group
- Leo Burnett Worldwide
- Lichtenstein Creative Media
- LTS Productions
- Institute of Rural Health
- Market Truths Limited
- Max March Industries
- Mazda
- MLB.com
- MTV
- National Physical Laboratory, UK
- The New Media Consortium
- Omnitel
- PA Consulting Group
- Reef ball foundation
- Reperes
- Reuters
- Simpson Millar LLP
- Sky News
- SL-hosting
- Slacker Astronomy planetarium
- SL Police
- Social Media
- Starlife Srl
- Starwood Hotels
- Sun Microsystems
- Telecom Italia
- Telus Mobility
- Text 100
- Toyota
- Trades Union Congress
- Union Network International
- New Unionism Network
- ver.di
- UNISON
- RSU IBM Vimercate
- Universal Motown Records Group
- The University of Southern California
- Wells Fargo
- The World Transhumanist Association

- Ontario Ministry of Government Services
- NASA
- United States Armed Forces
- NOAA
- State of Missouri
- Alameda County (California, USA)
- A Coruña Videá
- A Ilha Vestibular Brasil
- Aachen, RWTH University, Germany
- Aarhus Business College: Aarhus, Denmark
- Å...bo Akademi University, Turku, Finland
- Arkansas State University, Jonesboro, Arkansas, USA
- Anglia Ruskin
- Anne Arundel Community
- Arcada University of Applied Sciences: Helsingfors, Finland
- The Art Institute of California-San Diego San Diego, CA
- The Art Institute of Pittsburgh Pittsburgh, PA
- Audiocourses Music Production School: London, UK
- Australian Film TV and Radio School: Sydney, Australia
- Ball State University: Muncie, IN
- The Bay School of San Francisco: San Francisco, CA
- Beach College: Santa Barbara, CA
- University of Bedfordshire, Luton & Bedford, United
- Bentley College - Department of Natural and Applied Sciences: Waltham,
- Boise State University, Dept. of EdTech
- Bournemouth University, The School of Health & Social Care (HSC)
- Bowling Green State University
- Bradley University, Peoria, IL
- Bromley College of Further and Higher Education: Greater London, United
- Buena Vista University Storm Lake, IA
- Buffalo State College Buffalo, NY
- Unict Università degli studi di Catania: Catania, Sicilia, Italia
- California State University - Pomona: Pomona, CA
- California State University, Los Angeles
- Campus Hamburg
- Central Piedmont Community College - Futures Institute: Charlotte, North Carolina
- Chapman University: Orange, CA
- Clemson University
- Cochise College: Sierra Vista, AZ, USA
- College of DuPage
- College of Internet Distance Education of Assumption University Bangkok, Thailand

- Columbia College Chicago: Chicago, IL, USA
- Columbia University: New York, NY
- Cornwall College: Cornwall, UK
- Darton College: Albany, Georgia
- Derby University: Derbyshire, England, UK.
- Devry University: Oakbrook, IL
- Universidad de Artes Digitales UAD Digital Arts University
- Duke University: Durham, NC
- Drexel University: Philadelphia, PA
- Dyersburg State Community College: Dyersburg, TN
- East Carolina University Greenville, NC
- East Tennessee State University: Johnson City, TN
- Eastern University
- ECPI College of Technology
- Edinburgh University Edinburgh, Scotland, UK
- Elon University: Elon, NC
- Empire State College, SUNY
- TELECOM Bretagne : Telecom Bretagne France
- ESC Toulouse : Ecole Supérieure de Commerce de Toulouse / Toulouse Business School
- ESES - Escola Superior de Educação de Santarém - Portugal
(Education School from Politechnic Institute of Santarém - Portugal)
- European School of Visual Art (École européenne supérieure de l'image, Angoulême, Poitiers, France)
- Fachhochschule des Mittelstands Bielefeld
- Fachhochschule Düsseldorf University of Applied Sciences, Germany
- Fachhochschule Pforzheim
- Finger Lakes Community College: Canandaigua, NY
- Fontys University of Applied Sciences: Netherlands
- Fullerton College: Fullerton, CA
- Gerald D. Hines College of Architecture University of Houston: Houston, TX
- Georgia State University
- Glendale Community College Glendale AZ
- Graz, Austria, Technical University, Institut fuer Wohnbau
- Great Northern Way Campus - Centre for Digital Media
- goFluent
- Griffith University, Queensland, Australia
- Harvard University: Cambridge, Mass.
- Heinrich-Heine-Universität: Düsseldorf, Germany
- Helicon Opleidingen
- Heriot-Watt University, Edinburgh, Scotland, UK
- Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong
- Houston Community College, Houston TX, USA

- Huddersfield University, West Yorkshire, UK
- Idaho State University: Pocatello, Idaho
- Illinois State University: Normal, IL
- Indiana University: Bloomington, IN
- Insead
- Iowa Central College Online
- Iowa State University: Ames, IA
- Ithaca College
- Johnson & Wales University: Providence, RI & 5 Western States
- San Jose State University San Jose, CA
- Kalamazoo Valley Community College: Kalamazoo, MI
- Kansas State University
- Kiel, University of Applied Sciences
- Kingston University: London, UK
- Labette Community College: Parsons, KS
- Lancaster University: Lancaster, UK
- Lawrence University: Appleton, WI
- Lazarski School of Commerce and Law. Warsaw, Poland
- Leeds College of Art and Design: West Yorkshire, United Kingdom
- Leeds Metropolitan University: West Yorkshire, United Kingdom
- Lehigh Carbon Community College: Schnecksville, PA
- University of Leicester
- Loyalist College: Belleville, ON, Canada
- Loyola Marymount University
- Marlboro College Graduate School Brattleboro, VT, US
- Massachusetts Institute of Technology: Cambridge, MA
- Mayville State University: Mayville, ND
- Middle Georgia College: Cochran, GA
- Minneapolis College of Art and Design: Minneapolis, MN
- Minnesota State Colleges and Universities
- Mohawk College: Hamilton, ON, CA
- Monash University
- Monroe Community College Rochester NY
- Montana State University: Bozeman, MT, USA
- Montclair State University
- Mt. Hood Community College
- Mueller College
- Nelson Marlborough Institute of Technology, Nelson, New Zealand
- New York City College of Technology CUNY Brooklyn, NY
- New York University, New York City
- North Carolina State University, Raleigh, NC
- Northern Michigan University
- Nova Scotia Community College -- NSCC -- Nova Scotia, Canada

- Northern Illinois University DeKalb, IL
- Oakton Community College, Des Plaines IL
- Ohio State University
- Ohio University
- The Open University UK
- Penn State University
- Pontifical Catholic University of Rio de Janeiro (PUC-Rio), Rio de Janeiro, Brazil
- Princeton University: Princeton, New Jersey
- Rochester Institute of Technology, Rochester, New York
- Rice University: Houston, TX, USA
- Saint Leo University, Tampa, FL
- Sam Houston State University: Huntsville, TX
- San Diego State University
- San Jose State University: San Jose, CA, USA
- Solano Community College, Fairfield, CA, USA
- Stockholm School of Economics: Stockholm, Sweden
- Sungshin University – Korea
- St. John's University, New York,
- Tacoma Community College, Tacoma, WA, USA
- Texas State Technical College, Waco/Harlingen/Marshall/West Texas
- Texas State University - San Marcos
- Texas Wesleyan University, Fort Worth, Texas 76105
- Texas Woman's University, Denton, TX 76209
- Unipa - Università degli Studi di Palermo, Sicilia, Italia
- Universidad a Distancia de Madrid (UDIMA):
- University of Ulster, Magee. Northern Ireland, UK.
- Unisinos
- Universidad de San Martín de Porres: LIMA, Perú
- Università degli studi di Cagliari
- Universität Bielefeld
- Universität Duisburg-Essen: NRW, Germany
- Universität Frankfurt
- University of Hamburg (Universität Hamburg)
- Universität Konstanz
- University of Cincinnati: Cincinnati, OH, US
- University of Derby: Derbyshire, England, UK
- University of Edinburgh: Edinburgh, Scotland, UK
- University of Illinois at Chicago College of Medicine: Chicago, IL, USA
- University of Illinois at Urbana-Champaign: Urbana, IL, USA
- University of Kansas Medical Center
- University of Kentucky
- University of Louisville: Louisville, KY
- University of Michigan – Dearborn

- University of Northern British Columbia, Canada
- University of Notre Dame, South Bend, IN
- University of Nottingham, UK
- University of Plymouth: Devon, UK
- University of Portsmouth: Portsmouth, UK
- University of Queensland: Queensland, Australia
- University of Saskatchewan
- University of Sheffield, Sheffield, England, United Kingdom
- University of the Sinos Valley (Universidade do Vale do Rio dos Sinos) - UNISINOS, São Leopoldo, RS, Brazil
- University at Albany, Albany, NY, US
- University of South Alabama
- University of South Australia
- University of South Florida
- University of Southern Queensland, Toowoomba, Queensland, Australia
- University of St Andrews
- University of Texas at Austin: Austin, TX, USA
- University of Texas - Pan American: Edinburg, TX, USA
- University of the Pacific: Stockton, CA, USA
- University of Warwick: Coventry, UK
- University of the West of Scotland
- Paisley, Hamilton, Ayr & Dumfries, UK
- Tufts University
- Universidad Iberoamericana, Mexico City
- University of Wisconsin Oshkosh: Oshkosh, WI, USA
- Vanderbilt University
- Magazine Publishers Family Literacy Project: Princeton, NJ, USA
- Academia Electronica
- Apulian Meteorological Association
- Association for Educational Communications & Technology (AECT): Bloomington, IN
- The Association of Finnish eLearning Centre
- Biomedicine Research Labs
- Bridges for Women Society
- British Council
- Cape Cod School Technology Facilitators
- Coalition for the Re-Formation of the Euro-American Democratic Order (CRÆ†DO) Headquarters: Vancouver, British Columbia, Canada
- Contact a Family - For Families With Disabled Children
- Dream Quest Enterprises, Inc. (DQE)
- Education UK Island
- EdBoost, Los Angeles, USA
- Eduserv

- eXtension
- FDLRS - Florida Diagnostic Learning & Resources System
- Global Kids, Inc.: New York, NY, USA
- Huna International: "Volcano, HI, USA"
- Institut für Wissensmedien
- Institute of Rural Health: Idaho, USA
- Arizona Breast Cancer Research Center Breast brachytherapy Branch
- International Society for Technology in Education (ISTE): Washington, DC/Eugene, OR
- noWomannoLife a Swiss foundation active in the support of Mediterranean women
- Ohio Learning Network: Columbus, OH
- Open Knowledge and the Public Interest
- Opera Joven, AC
- Rockcliffe University Consortium: Newport Beach, CA
- Saint Leo University
- Senior Project Center
- Social Science Research Council: New York, NY, USA
- Study Guides and Strategies
- SVIKA, Copenhagen Denmark
- The Center For Internet Research (tcfir) Breckenridge, Colorado, USA
- The New Media Consortium (NMC)
- The Sloan Consortium (Sloan-C)
- Rede da Juventude pelo Meio Ambiente e Sustentabilidade
- Coletivo Jovem Caipira de Meio Ambiente
- Virginia Society for Technology in Education (VSTE): Richmond, VA
- UPB Universidad Pontificia Bolivariana Bucaramanga: Bucaramanga, Colombia
- Avatar English & Avatar Languages: La Paz, Bolivia
- International Schools Island (isi)
- LanguageLab.com - A Real School in a Virtual World
- The Islands of Jokaydia
- Sprott Shaw Degree College: British Columbia, Canada
- VHS Goslar
- Alliance Library System: East Peoria, Illinois, USA
- Bayerische Staatsbibliothek (Bavarian State Library): Munich, Germany
- Cleveland Public Library: Cleveland, Ohio, USA
- Marriott Library, University of Utah
- Orange County Library System, Orlando, FL
- Nova Southeastern University - Law Library & Technology Center: Davie, FL
- Public Library of Charlotte and Mecklenburg County: Charlotte, North Carolina, USA
- State Library of Kansas
- SC State Library: Columbia, SC, USA

- Exploratorium in San Francisco
- The Underground Railroad in Ohio
- Old Masters Picture Gallery Dresden
- Chemistry in Second Life

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