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A Typology of Virtual Worlds: *Historical Overview and Future Directions*

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Abstract

Virtual worlds constitute a growing space for collaborative play, learning, work, and e-commerce. To promote study of this emerging realm of activity, we suggest a typology adapted from C. Porter's (2004) typology of virtual communities. The five elements of the proposed typology include (1) purpose (content of interaction), (2) place (location of interaction), (3) platform (design of interaction), (4) population (participants in the interaction), and (5) profit model (return on interaction). We argue that this five-element typology facilitates identification of (a) the historic antecedents of virtual worlds in gaming and social networking, (b) future applications of virtual worlds for society, education, and business; and (c) topics for future research.

Keywords: virtual worlds, typology, electronic gaming, online social networking.

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A Typology of Virtual Worlds: *Historical Overview and Future Directions*

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Virtual worlds are playing an increasingly important role in the lives of many adults, teens, and children. According to one estimate, 20 to 30 million people regularly participated in virtual worlds in 2006, spending an average of almost twenty-two hours per week within these spaces (Balkin & Noveck, 2006). For those who participate in them, the names of these worlds are household words, including (adult worlds such as) Second Life, World of Warcraft, Kaneva, Entropia Universe, Google Earth; (children's worlds, such as) Webkinz, Neopets, Club Penguin, Habbo, Whyville, TyGirly, and RuneScape; (community-specific worlds, such as) Cyworld, HiPiHi; (media-focused worlds, such as) vSide; (and educational worlds such as) ActiveWorlds, there.com, and Forterra Systems.

Indeed, virtual worlds are believed to have implications that go beyond how we play, to also include how we buy, work, and learn (Bartle, 2006 and Balkin & Noveck, 2006). According to research firm Gartner, Inc., "by the end of 2011, 80 percent of active Internet users (and Fortune 500 enterprises) will have a 'second life'" (i.e., an avatar or presence in a virtual community like Second Life; Gartner, 2007). In recognition of the growing importance of avatars as 3D representations of people and their alter egos in virtual worlds, Google has a project underway to develop "universal" avatars that can move between virtual worlds (Lohr, 2007). Some authors even suggest that the 3-D Internet will become as important to companies in five years as the Web is now (Driver et al. 2008).

Yet, because of their newness, the study and application of virtual worlds is still in its infancy. Research questions are only now being formulated by scholars scrambling to come to terms with the implications of these new social environments. Suitable methodologies are only beginning to be selected, and technical support required to carry out these methodologies is only in the developmental stage. Similarly, the viability of various social and commercial applications of virtual worlds is only now being tested.

The purpose of this essay is to facilitate study of these worlds by proposing a typology of virtual worlds, adapted from C. Porter's (2004) typology of virtual communities. We support the relevance of this typology by arguing that each of the five elements of the typology played critical roles in the historic evolution of gaming and social networking at pivotal times in this evolution. We then argue that recognizing these five elements is helpful for identifying future applications and research questions.

Section 1 begins by tracing the history of virtual worlds to its origins in gaming and social computing. Section 2 describes our suggested typology of virtual worlds. Section 3 argues why this typology is relevant to understanding the historical progression leading to virtual worlds. Section 4 suggests how this typology is useful for understanding the future implications

of virtual worlds, in terms of applications, possible new technologies, and future directions for research in social, business, and computing sciences. Section 5 concludes.

1. Antecedents of Virtual Worlds in Gaming and Social Computing

Open or unstructured virtual worlds represent a blending of the elements of immersive 3D gaming environments, developed in the gaming industry over the last 25 years, together with elements of online social networking. This conclusion can be seen by tracing the development of electronic gaming since the 1970s, including (a) arcade games, (b) console games, (c) LAN games with more players, (d) games with Internet connectivity, (e) unstructured games with many players, (f) massive games with user-generated content, and (g) immersive 3D worlds with designer-provided objectives. Open virtual worlds combine the last three items with elements of web-based social networking. Open virtual worlds, thus, consist of massively multiplayer gaming platforms with unstructured objectives, user-generated content, immersive 3D virtual reality shared environments, and social networking elements used between people through their avatars. (For elaboration on the historical development of the electronic gaming industry see Castronova 2002 and Messinger et al. 2008. This section draws material from the latter source.)

1.1. Historical Progression

We can trace the roots of virtual worlds by examining the historical development of the video gaming industry and of social networking sites.

Arcade Games. The video game industry is widely believed to have been launched when Pong was released by Atari Interactive in November 29, 1972 (Wiki/pong, 2008). While not the first entrant into this emerging market, it became the first highly successful coin-operated arcade video games (Herman et al., 2008), and was soon followed by *Tank*, *Indy 500*, *Space Invaders*, and *Pac-Man* (Winter, 2008). These games added the element of real-time video interactivity, which enhanced reflexes and provide the excitement of real activity, to the key elements of earlier games which involved (a) strategic and tactical objective-oriented problem-solving (e.g., chess, go, bridge, and poker; see Castronova, 2002, Figure 1) or (b) thematic and fantasy role-playing (e.g., Parker Brothers Co.'s *Monopoly*), or some combination of these (e.g. historic battle simulations, including *D-Day*, *Midway*, *Bismarck*, *Stalingrad*, and sports simulations, including *Stratomic Baseball* and *Football*). Many of the earliest video games were single-player games played against the computer.

Console Systems. In 1986, the Nintendo Entertainment System was released across the U.S. (previously released as Famicom in Japan), featuring popular characters like Mario, Donkey Kong, Zelda, and Popeye (Herman et al., 2008). Many of these games were initially for a single player, but subsequent generations of games permitted players to compete against each other. Sporting games had been a major success with users of the early console systems; popular fighting games subsequently elevated home console gaming to a new level with such releases as *Street Fighter II* and *Mortal Kombat*. Some modern forms of console systems, such as the Nintendo Wii system, include dynamic user interfaces for various physical games and electronic sports.

LAN Games. LAN (Local Area Network) parties provided yet another venue in which to experience social interaction through gaming. The games in these events were computer-based

instead of console-based. LANs required everyone present to load the same software, but then allowed for an essentially unlimited number of participants. Most of the games used in these sessions were first-person shooter (FPS) games, where the objective was to simply, and often (electronically) barehanded, wreak havoc (Jansz & Martens, 2005).

Internet Connectivity. In the mid-1990s, Nintendo, Sega, and Sony introduced more powerful consoles that used compact discs and 32- and 64-bit systems (Herman et al., 2008). With time, Sega would drop out of the console race and focus solely on software development for the different gaming platforms. The next stage of modern gaming consoles took shape with the start of a new millennium. As Personal Computer (PC) and Internet technology grew at a rapid pace, so too did the video game consoles' capabilities. Releases of the PlayStation 2 and Microsoft Xbox offered gamers the ability to connect to the Internet and play against and talk with other gamers. This completely redefined what types of games would be popular in the home. With a network of users able to join in on a game, the landscape of video games became much more expansive, not only geographically, but also in terms of the nature of the social interaction they enabled.

Unstructured Games. Subsequent game forms permitted freedom for the player to roam around a large world, rather than proceed along preset paths only. One particular genre of "god games" afforded the player an omnipotent role. Some games also introduced shared player contributions through the Internet. "Sandbox", "open", or "unstructured" games introduced freedom into gaming that did not previously exist. The *Grand Theft Auto* series, though controversial, serves as an excellent example. These expansive settings and freedom of movement coupled with injections of realism into the surroundings — such as progression of daily time in a 1 second to 1 minute ratio — creates an immersive environment unlike structured gaming (Murray, 2005).

Games with Player Generation of Content. Some games took this trend one step further and presented the gamer with near-total freedom within the game environment, if not always total control over its behaviors. Peter Molyneux introduced the "god game" in 1989, where the player is quite literally near-omnipotent (Au, 2001). The massively successful *The Sims*, its sequels *The Sims Online*, *The Sims 2*, and the upcoming *Spore*, provided the player a certain amount of control of their environment and the ability to generate their own content (Kelly, 1994), including "skins" for the avatars, new types of decor for the homes, and new pieces of furniture. Indeed, Electronic Arts (the producer of *Sims* games) claims that over 80% of the game's content is made by users (Ondrejka, 2006). (This alone was not new; in 1996, *Quake* became the first multiplayer, freeform game that provided open standards which allowed for user contributions; Hinton, 2006). Nevertheless, despite the user-generated content, in these environments players are still playing a game with online components; they do not exist in a virtual world. New entrants changed this and took the potential of such Internet frameworks beyond the entertainment realm.

Worlds with Designer-Provided Objectives. In worlds such as *World of Warcraft*, *Everquest*, *Lord of the Rings Online*, *City of Heroes/Villains*, and *Age of Conan*, avatars can wander where they wish, but also gain certain skills and strengths by earning experience points (Lastowka & Hunter, 2006). Some of these worlds are beautifully rendered, and players' avatar identities are maintained and develop over time, responding, in part, to significant interaction with other people's avatars. These massively multiplayer on-line role-playing games

(MMORPGs) offer small "quests," or designer-provided objectives that serve as games within the larger game (Song & Lee, 2007). Some of the worlds have become very large in their scope and number of participants; *World of Warcraft*, for example, has over 10 million subscribers (Blizzard, 2008). Nevertheless, these MMORPGs reflect the designer-intended gaming tradition which also influenced earlier electronic games.

Social Networking Sites. Although not gaming, *per se*, social networking sites influenced the development of virtual worlds. These environments support members pursuing their own objectives of socializing and sharing of textual and pictorial content (and, increasingly, audio and video content). The first instance of a social networking platform was SixDegrees.com, launched in 1997 (according to Boyd & Ellison, 2007). These platforms allow members to (a) easily create "profiles" with information about themselves, and (b) support the differentiation of public vs. private information on members' profiles, with authorized access to the private aspects of the members' profiles only to their "trusted" circle of friends. Other common features include communication media such as blogging, instant messaging and chat, notifications when the profiles of one's friends have been updated, introductions to friends of friends, reviewing of content and tagging with general comments, and content recommendations based on the members' comments and reviews. The sites can be *geographically-based* assuming a particular language and cultural etiquette (e.g., Cyworld was initially launched in South Korea in 1999), *demographically-based* (e.g., neopets.com is for children, nexopia.com is for teens, and Facebook was originally for Harvard students), or *activity-based* (e.g., LinkedIn for professional introductions, YouTube for video sharing; Dogster and Catster to exchange pet information; hisholyspace.com for faith-based exchange). These environments bring together most elements that have come to be considered under the heading of "web 2.0" technologies in simple, highly usable ways for people who have little to no technical expertise. (For a thoughtful survey of the various social networking sites, together with a historical overview, see Boyd & Ellison, 2007).

Open Virtual Worlds. The distinctive feature of open virtual worlds is the social interaction among people and their avatars that occurs in a 3D immersive shared environment with user-chosen objectives, user-generated content, and social networking tools. Virtual worlds, thus, combine the previous four elements described above. In these worlds, people can form relationships as friends, romantic partners, virtual family members, business partners, team members, group members, and online community members. They can also create things, and save, give, or sell what they created to other people. And, as the objects that are created might be desired by others, they suddenly have value in the real-world economy (Lederman, 2007; Lastowka & Hunter, 2006). These various features make virtual worlds as desirable virtual spaces for collaborative play, learning, and work. According to Bartle (2006, page 31), "[f]rom their humble beginnings, virtual worlds have evolved to become major hubs of entertainment, education, and community." And further, according to Balkin & Noveck (2006) "[a]lthough the development of these virtual worlds has been driven by the game industry, by now these worlds are used for far more than play, and soon they will be widely adopted as spaces for research, education, politics, and work."

1.2. Outcome of this Historical Progression

Gaming and virtual worlds have grown to be an important form of entertainment. Historically, the gaming industry progressed through a sequence of developments involving arcade games, console games, LAN games with multiple players, games with Internet

connectivity, games with many players, massive games with user-generated content, and immersive 3D worlds with designer-provided objectives. Purely as a popular form of entertainment, gaming has grown to compete in size with the movie industry. By 2007, the computer and video game industry alone was able to generate \$18.85 billion dollars in global sales, \$9.5 billion in game sales, \$9.35 billion in console sales (Bangeman, 2008). If the predictions for future growth within the industry are correct, this number should more than double by 2010 (Kolodny, 2006).

But beyond the realm of entertainment, much activity in virtual worlds is growing in the realms of business, education, and culture. Concerning advertising and promotions, S. Barnes (2007) provides a list of 126 prominent real life brands in Second Life as of August 31, 2007, including IBM, Mercedes, Pontiac, Nissan, Dell, BMG (in the media Sector), and PA Consulting (in management consulting). Concerning retailing and service businesses, in February 2007, there were 25,365 business owners in Second Life (DMD et al., 2007), most of whom owned stores, rented real estate, or managed clubs. Concerning education, over 150 universities have a presence in SL, and some of them actually use SL for classes and other education purpose (Graves 2008). Business, public organizations, and cultural groups are using the environment for conferencing, public meetings, delivering informational services, and performances or exhibits. Because of the growth of activities in these worlds, it is increasingly important for us to categorize the differences between these worlds and to understand the implications of these differences in terms of how humans function in them and the resulting societal outcomes.

2. Typology of Virtual Worlds

Given this history, our goal is to consider a typology of virtual worlds to promote further study and application of them. Virtual worlds are increasingly perceived as an opportunity for economic activity, and many retail and service organizations, as well as some governments, have established a presence in these worlds. Despite receptive coverage in the press, it is not yet entirely clear, however, what value virtual worlds add to more traditional e-commerce and e-government, or how organizations and individuals can harness this value. One question involves identifying which virtual worlds are appropriate for which activities and why.

To help answer such questions, we follow C. Porter (2004), who proposed a five-element typology of virtual communities. We utilize the same five elements, but extend the typology to electronic games, social networks, or virtual worlds. Our addition is to modify what can be used as descriptors of the typology elements to make them applicable for these new contexts, as follows:

1. Purpose (Content of Interaction): Porter focuses on the specific type of information or content being communicated among the virtual community. We focus on (a) whether a game has a strategic, tactical, or thematic appeal, (b) whether the network is themed (has a specific purpose) or is open, and (c) for virtual worlds, whether there is an age focus, a content focus, or it is open.
2. Place (Location of Interaction): Porter focuses on whether the notion of place is completely, or only partially virtual. We also consider whether players are collocated or geographically dispersed.

3. Platform (Design of Interaction): We follow Porter by focusing on synchronous communication, asynchronous communication, or both. In addition to looking at PC platforms connected by the Internet, we also include various gaming platforms.

4. Population (Pattern of Interaction): We follow Porter by focusing on the size of the group. Porter also considers the types of social ties; we consider distinguishing characteristics of the target user market.

5. Profit Model (Return on Interaction): Porter focuses on revenue or non-revenue generating environments. We elaborate on her taxonomy by examining whether the world supports (1) a single purchase price or registration fee (i.e., fixed fee); (2) fee per use (i.e., variable fee); (3) subscription based (and on what basis subscriptions are made); (4) advertising-based; (5) pay-as-you-go extras (virtual assets including clothing, land, and software); and (6) sale of ancillary products, such as real stuffed animals and accessories, which are accompanied by passwords for accounts in virtual worlds where virtual versions of the products enable combined real and virtual play.

Table 1 demonstrates how this typology is useful for distinguishing between various games, online social networks, and virtual worlds over the last few decades. The purpose varies according to whether the objective is strategic, thematic, open, educational, media sharing, or for socializing young people. The place of interaction differs on whether the players need to be collocated or whether they can be dispersed. The platform differs (in part) according to whether interaction occurs synchronously through the Internet, asynchronously, using a LAN, using a console system, or a board game (face-to-face). The population depends on whether there are two players, a few players, many players, and, if the latter, the nature of the user segment targeted. The last element describes the whether the business model associated with the platform is based on a fixed user-fee, subscriptions, advertising from sponsors, virtual extras sold to users, or real-world ancillaries.

Porter has argued that the five elements of this typology (purpose, place, platform, population, and profit model) meet five criteria for a good typology, established by Hunt (1991). These criteria are as follows:

(1) Is the phenomenon to be classified adequately specified? (2) Is the classification characteristic adequately specified? (3) Are the categories mutually exclusive? (4) Is the typology collectively exhaustive? (5) Is the typology useful? In this section, Criteria 1-4 will be used to assess the adequacy and strength of the proposed typology. The final criterion of usefulness is considered most vital in an evaluation of a typology (Hunt, 1991). [Porter, 2004]

Table 1. Typology Applied to Selected Games, Online Social Networking Sites, and Virtual Worlds*

	Purpose	Place	Platform	Population	Profit Model
<i>Games</i>					
Chess	Strategic Objective	Collocated	Board Game	Two Player	Fixed Fee
Monopoly	Thematic Objective	Collocated	Board Game	2 – 6 Players	Fixed Fee
FPS - Console	Tactical Objective	Collocated	Console Systems	1 – 4 Players	Fixed Fee + Extras
FPS - LAN	Tactical Objective	Collocated	LANs	1 – 1,000+ Players	Fixed Fee + Extras
Internet Scrabble	Strategic Objective	Dispersed	Synchronous	2 – 6 Players	Variable Fee
The Sims Online	Thematic Objective	Dispersed	Synchronous	Mass Market	Free + Extras
World of Warcraft	Tactical/Thematic Objective	Dispersed	Synchronous	Mass Market	Fixed Fee + Subs + Extras + Ads
<i>Online Social Networking Sites</i>					
LinkedIn	Themed Network	Dispersed	Asynchronous	Businesspeople	Free+Ads+Extras
Hisholyspace.com	Themed Network	Dispersed	Asynchronous	Religiously Affil.	Free+Ads+Extras
Dogster, Catster	Themed Network	Dispersed	Asynchronous	Children	Free+Ads+Extras
Flixter	Themed Network	Dispersed	Asynchronous	Interest Group	Free+Ads+Extras
YouTube	Themed Network	Dispersed	Asynchronous	Interested in Video	Free+Ads+Extras
MySpace	Open Network	Dispersed	Asynchronous	Young Adults – Creative	Free+Ads+Extras
Facebook	Open Network	Dispersed	Asynchronous	Young Adults	Free+Ads+Extras
<i>Virtual Worlds</i>					
ActiveWorlds	Education	Dispersed	Synchronous	Mass Market	Subs+Extras+Ads
Forterra Systems	Education	Dispersed	Synchronous	Mass Market	Subs+Extras+Ads
HiPiHi	Open	Dispersed	Synchronous	Chinese	Subs+Extras+Ads
Sony PlaySt. Home	Teen Play	Hybrid	Synchronous	Plays & Owners	Subs+Extras+Ads
Vside	Media Sharing	Dispersed	Synchronous	Young People	Subs+Extras+Ads
Webkinz	Child's Play	Hybrid	Synchronous	Children	Ancillaries +Extras
Second Life	Open	Dispersed	Synchronous	Mass Market	Subs+Extras+Ads

*We apply C. Porter's (2004) typology of virtual communities to games, online social networking sites, and virtual worlds, using our own descriptors for each of the five typology elements.

FPS = First Person Shooter Game
Ads – Advertising

Subs – Subscriptions
Hybrid – Both Collocated and Dispersed.

We do not repeat the arguments for the first four criteria here, since the case has already been made in the context of virtual communities (Porter, 2004), and since virtual worlds are a particular form of virtual community. Instead, we assess the fifth criterion “Is the typology useful?” In the next two sections, we argue that the five-element typology is useful for (a) interpreting the historical progression leading to virtual worlds, and (b) identifying future applications and research topics involving virtual worlds.

3. Interpreting Historical Antecedents of Virtual Worlds

We now argue that this typology provides insight into the historical progression leading to virtual worlds described earlier.

The engine behind development of virtual worlds ultimately has been new technologies embodied in successive platforms for participant interaction. This made possible participant interaction that was local or remote, covering potentially distant geographic locations (places). More powerful platforms also made possible interaction between larger groups of people (populations). Furthermore, more complex interaction made possible, and even necessitated, more complex payment structures (profit models). Most fundamentally, advances in communication and computing platforms facilitated diverse objectives of interaction (designed to meet different purposes). While new technology is the underlying causal agent, or catalyst, this is not necessarily simple logic between a single cause-effect pair. Rather, we encounter the process of technological enabling whereby new technology gives rise to new potentialities; and people and organizations achieve these potentialities in a succession of steps, as new practices are learned and new institutions are developed to facilitate collaborative use of these new technologies. Such a process occurred with the development of language, itself; the emergence of the printing press, and with more recent technological advances such as the telephone and radio (Leblebici et al, 1991). This process has recently occurred with the emergence of electronic gaming, social networking, and virtual worlds. In a nutshell, this summarizes our core argument about the historical development of virtual worlds (summarized in Section 1).

But the process of development has been somewhat more complex, whereby certain elements develop in parallel and others, occur in a clearer temporal sequence. The typology above provides a useful way of organizing some of these historical interactions. We accordingly give a sketch of the evolution of each of the five typology elements.

First, past innovations in games, social networks, and virtual worlds generally serve a new function or purpose. That is what makes them innovations. This consideration is described well by the first element of the typology, *purpose*. Early games were distinguished by whether the participant’s purpose was to play a game with a strategic objective or with a thematic objective. Early video games involved tactical objectives. New online social networks and virtual worlds either revolve around a particular theme or activity, or have open objectives, as determined by the participants. Indeed, many of the historical turning points in this set of industries (summarized in Section 1 and Table 1) revolve around uncovering and addressing new *purposes* for gaming and social networks (the first dimension of this typology).

Second, the above historical progression is marked by a shift from a platform that requires participants to be collocated, to a platform that allows them to be geographically

dispersed, by virtue of the Internet. This consideration is described well by the second element of the typology, *place*. (Place can also be used in a more detailed sense as describing the geographic target market, and, indeed, new online technologies, particularly those involving adaptation of different languages, permit increased geographic customization and targeting.)

Third, a key element that fundamentally distinguishes between online social networks and virtual worlds is whether the interaction with other users is asynchronous or synchronous. This consideration is described by the third element of the typology, *platform*. Whether the interaction is asynchronous or synchronous determines whether communication is separated in both time and distance or whether social interaction takes a more immersive form. The psychological meaningfulness of these two forms of communication is potentially quite different, as well as the kinds of information that can be easily accommodated. The element “platform” also can be used to distinguish between whether game players interact through the Internet, a LAN, a console system, or face-to-face (for a board game). A number of more specific features of the technology platform (in addition to those shown in Table 1) can also be used to distinguish between the offerings of different virtual worlds.

Fourth, a critical distinction between various virtual worlds, online networks, and games depends on the intended number of participants and the target segment of people from which to draw the participants. This is described by the fourth element of the typology, *population*. Early gaming progressed from two person games, to games for a few players, to multi-person games targeted at either children or adults. Larger games were also targeted to particular user segments, special interest groups, or open to permit and encourage diversity of people (as well as objectives). Typically, after a particular platform was proven, such as an electronic console game, an Internet-based game, an online network, or a virtual world, the environment experienced innovation in the form of new instances of these platforms targeted to different population segments.

Fifth, an important issue concerns the business model that supports the platform provider. Most business models are based on (a) a fixed fee, (b) subscriptions, (c) advertising from sponsors, (d) virtual extras sold to users, (e) real-world ancillaries, or (f) a combination of these elements. This is well described by the fifth element of the typology, *profit model*. This element also influences the nature and sustainability of a particular world, network, or game. Historically, many profit models began with a fixed fee. Online systems also permitted using subscriptions. But as platforms increasingly developed large networks of users, the possibilities for advertising by sponsors grew. Real-world ancillaries have always existed as a source for supplementary income for games, just as with movies. But worlds such as Webkinz turned this upside down, by making the purchase of the ancillary plush animal the key revenue generator and the entry-point into the world. Finally, online extras, by participants wishing to enhance their online experience, have become increasingly important as a source of revenue generation for such environments as Second Life, Battlefield Heroes, and the popular FIFA Soccer game in Korea. The extras in Second Life include real estate. The extras in Battlefield Heroes included armor and weapons. The extras in FIFA Soccer include virtual cleats and jerseys. Indeed, the newest edition of Battlefield Heroes was recently released on the Internet for free, with all revenues planned to come from subscriptions and on-line extras (Pilienci, 2008).

We, thus, see that the five typology elements are useful for interpreting the historical progression of electronic gaming and online social networking that ultimately led to virtual worlds.

Indeed, the five elements (purpose, place, platform, population, profit model) focus on critical questions that journalists, marketers, and service providers are taught to ask: (1) For what purpose? (2) Where? (3) How? (4) Who? and (5) How much?

4. Identifying Future Applications and Research Topics

We now argue that the five typology elements are also helpful for categorizing and examining the future of virtual worlds on several dimensions, including (1) applications for business, ecommerce, and education, (2) potential new technological features, and (3) future research topics in the social, business, and computing sciences.

Applications. Future applications of virtual worlds may be suggested by the proposed five typology elements. Some possibilities include uncovering new purposes for virtual worlds (e.g., mechanisms to facilitate supplier-manufacturer or manufacturer-retailer relationships), new places for utilizing virtual worlds (e.g., mobile devices), new functionalities in the platform (e.g., improving avatar's gestures and facial expressions as a means of communication), new target population segments (e.g., new mothers), and new profit models (e.g., bundling virtual world memberships with Internet service).

In addition, because of the growth of consumer participation in virtual worlds, firms will need to learn to manage the utilization of these worlds for the following business decisions:

- (1) Choosing in which worlds to promote, advertise or engage in other communications;
- (2) Selecting in which worlds to open e-commerce stores, e-government activities, and virtual service offices;
- (3) Choosing in which worlds to offer classes; and
- (4) Choosing in which worlds to perform market research, such as focus groups, surveys, and test markets.

Toward this end, it will be useful for public relations agencies and communications scholars to compile data on (a) the demographics and psychographics of users in the different worlds, (b) the kinds of activities in which these users engage, and (c) the kinds of messages or products to which users of particular worlds are most amenable. Such data would go beyond Table 1 to include many extant virtual worlds. The typology advanced in this paper will facilitate categorizing data about the different virtual worlds in this way.

Technology. The above typology may be useful for helping to identify and project directions that future technologies might take in electronic gaming, online social networking, and virtual worlds. Ideas may be suggested by recognizing that the goal of new technology is to facilitate new purposes, reach new places, provide for new platform functionalities, target new population segments, and make possible new profit models.

Research. Lastly, the five typology elements can also be helpful for organizing past research in the social, business, and computing sciences, and for identifying gaps for new research. Table 2 provides a detailed list of research topics organized around the typology described in this paper. For elaboration, see Messinger et al. (2008), who group these topics, instead, by research discipline. By comparison, our proposed typology has two benefits as an organizing scheme: (1) the typology is more economical with space and (2) the typology explicitly recognizes similar issues addressed by different disciplines. We think these are intriguing topics and encourage readers to peruse them.

Table 2. Virtual Worlds (VWs): Open Questions and Past Work

Typology Elements	Open Questions for Research and Application	Past Work
Purpose	How can VVs be used? For video conferences? For corporate training? For virtual workspaces? To facilitate collaborative design? For education and distance learning? As a place in which to do market research or test markets? What are people's motivations within VVs?	Boulos et al. 2006, Bronack et al. 2006, Bugeja 2008, Dickey 2005, DiPaola et al. 2007, Driver et al. 2008, Edwards 2006, Graves 2008, Maher et al. 2005, Nebolsky et al. 2003, Roy & Kodkani 1999, Rosenman et al. 2007, Ragusa & Bochenek 2001.
Place	Are standards of social behavior in VVs evolving differently from those in the physical world? What social values? Norms? Etiquette? Gift-giving? Sexuality? Attitudes toward cheating? Do behaviors and attitudes learned in VVs affect behaviors and attitudes in the real world? Do VVs influence attitudes toward violence, sexuality, and conservatism? Are cross-over effects present between in-world and real world retailing and service delivery? Should VVs be regulated (as compared to regulation of ISPs)? Are virtual casinos gambling? Will laws and regulation influence creativity and productivity in VVs? Are virtual profits taxable? By what government? Is there a new form of art emerging in VVs?	Adrian 2007, Anderson and Bushman 2001, Balkin & Noveck 2006, Cole and Griffiths 2007, Christ & Peele 2008, Jansz & Martens 2005, Grabowski & Kruszewska 2007, Herman, et al., 2006, Hugues 2007, Mayer-Schoenberger & Crowley 2006, Melby 2008, Mennecke et al. 2007, Methenitis 2007, Nobel 2006, Ondrejka 2006, Sherry 2001, Smyth 2007, Whang and Chang 2004, Yee and Bailenson 2007, Yee et al. 2007.
Platform	How does the nature of the platform influence people's behavior? Do synchronous and asynchronous forms of interaction differ in meeting people's information needs, stimulating social interaction, or engendering trust? Does the monetary system in VVs influence behavior? How can VW platforms be utilized for virtual service delivery and customer relationship management, electronic retailing, teaching, and libraries? What types of services, products, or courses are most suitable? How should the appearance of an avatar sales agent or instructor be designed? Are different platforms more or less conducive to self-governance within VVs?	Farkas 2007, Goel & Mousavidin 2007, Hans et al. 2006, Hendaoui et al. 2008, Holzwarth et al. 2006, Kadavasal et al. 2007, Kim et al. 2008, Sipress 2006, Swanson 2007.
Population	For media placement, what are the demographics, psychographics, geographic characteristics, membership sizes, and participation levels of various virtual worlds? Do virtual worlds influence consumers' self-concept?	Barnes 2007, DMD et al. 2007, Edery 2006, Hans et al. 2006, Hemp 2006, Subrahmanyam et al. 2004, Yee 2006.
Profit Model	Will VVs support themselves with a single up-front fee, periodic subscription payments, advertising, pay-as-you-go extras, or sales of ancillary products?	Leblebici et al. 1991, MacInnes 2006.

4. Conclusion¹

Overall, this paper considers a typology for virtual worlds consisting of (1) purpose, (2) place, (3) platform, (4) population, and (5) profit model. We have argued that this typology is helpful for interpreting the historical progression of innovations in electronic gaming, online social networking, and virtual worlds. We have also argued that the typology can assist in identifying (a) future applications for business, ecommerce, and education; (b) potential new technological features; and (c) research topics in the social, business, and computing sciences.

One limitation of the typology discussed in this paper is that, as the area changes, other emergent features may become worth incorporating into it. For example, an alternative way of categorizing virtual worlds could distinguish between types of engagement that people have with the virtual world. (<http://www.kzero.co.uk/blog/?p=991>). This would involve rethinking or adding to the “platform” element of the above typology.

Our hope is that this typology will be useful in the future development and application of virtual worlds, as well as for research and teaching. Virtual worlds permit rich interactions between users; they can exchange messages, objects, and money; they can communicate through voice over a headset and microphone; they can see each other’s avatars interacting with the environment, and they can “experience” the world through a variety of activities, including dressing, changing their avatars’ shapes, touching things, building and owning things, engaging in quests, doing sports, dancing, hugging, and kissing. No doubt, much of this activity is for entertainment, but many opportunities are created for education, e-commerce, and cultural development. In closing, as we consider future directions, we are only limited by our imaginations – and virtual worlds are expanding those as well.

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