

# Use of Massively Multiplayer Online Games for Intelligence Gathering, Recruitment, and Training Purposes

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**Abstract**—Game has always been an indispensable part of human life. Since the early days of mankind, different types of games evolved hand in hand with civilization. The advent of personal computers in the 1970s, the spread of the internet in the 1990s, and the emergence of broadband connections as of the 2000s, brought about a revolution in the game industry in the form of what is called Massively Multiplayer Online Games (MMOGs). In this paper, it will be attempted to emphasize the importance of MMOGs in the light of the opportunities they provide for non-gaming purposes like intelligence gathering, recruitment, and training by states or non-state actors.

**Index Terms**—intelligence, Massively Multiplayer Online Game, recruitment, terrorism, training

## I. INTRODUCTION

SINCE the beginning of civilization, power and security have been inseparable and vital elements for the equation of human existence. Situations of power maximization appear to be the most secure moments in political history. Power has been defined in various ways by different scholars, strategists and politicians throughout history. However, Morgenthau seems to have made the most accurate definition for today's cyber-driven world [1]. He defines power as the ability to control other people's minds and actions. Accordingly, in today's world, individuals, institutions or states, should assess all plausible scenarios concerning the factors that shape the mindsets of people they interact with, in order to prevent breaches in their defensive structures. This indicates a new security paradigm based on a broader definition of warfare.

In 1989, near the end of the Cold War, William S. Lind and several other military experts proposed the concept of "fourth generation warfare" in an attempt to explain the new security environment [2]. While the first three generations of warfare were centered on military doctrines, the fourth generation's focus has shifted towards the non-military aspects of power

struggle, they argue. In this type of warfare, opponents aim to exert force through mostly indirect means such as propaganda, financial manipulation, provocation, or other sorts of subversive activity. When military conflict is unavoidable, it usually happens in an asymmetric fashion, where proxies such as insurgent groups and terrorist organizations are employed against military and/or civilian targets.

Arguably, the most crucial factor that brought about this qualitative shift towards a more inclusive conception of warfare has been the spread of the internet. With its pervasive impact, the internet has been transforming societies across national borders in every aspect, unifying and diversifying people in unpredictable ways so that they become a "network society," whose dynamics and actions cannot be effectively controlled by local authorities [3].

With its diffuse and non-hierarchical structure, the internet constitutes an invaluable platform for real time economic and social interaction on a global scale. However, the same platform can be used for both legal and illegal activities. In the last two decades, it has been understood that "cybercrimes" such as hacking, identity theft, and denial-of-service attacks are only a small fraction of what the internet provides for actors with criminal intent. Today, it is known that cyberspace is being effectively used by terrorists, drug traffickers, money launderers etc., for communication or other purposes.

Moreover, even perfectly legal use of internet-based social media platforms may have a drastic impact on national security, as has been recently seen in massive protests and uprisings around the world. In 2011, during the Egyptian revolt, a protester in Cairo was quoted as saying, "we use Facebook to schedule the protests, Twitter to coordinate, and YouTube to tell the world," effectively summing up internet's function in a fourth generation "battlefield" [4]. As Kendircioğlu et al. emphasize, "interdependent and interconnected networks and devices using information and communication technology, [offer] perfect tools for irregular actors to gain or erode popular support and question the legitimacy of the opponent" [5]. Hence, the effects of widespread internet use among their citizens, have become a major concern for nation-states.

Recently, in addition to all that has been said above, yet another way of exploiting the internet for political and/or criminal purposes has come to the forefront, but in a rather

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unexpected medium: Massively Multiplayer Online Games (MMOGs), where millions of people from around the world meet and interact in Virtual Worlds (VWs), using identities of their choosing. This topic drew much attention when, in 2013, Edward Snowden leaked secret documents concerning NSA's and GCHQ's activities in two popular MMOGs. However, as early as 2008, it was already known that American intelligence was about to start a program that aims to collect intelligence from such games [6].

As counter-intuitive as it may seem at first, MMOGs may have a substantial value from a national security perspective in today's world of fourth generation warfare, both as sources of opportunities and threats, depending on who utilizes them, and how. In this paper, it will be attempted to emphasize the importance of this subject matter in the light of relevant technical and scientific knowledge. It will be shown that MMOGs constitute a fertile ground for gathering intelligence on individual or groups of players, for finding and engaging potential recruits, and for indoctrinating and training them.

## II. THE CONCEPT OF GAME FROM A FUNCTIONALIST PERSPECTIVE

### A. Definition of Game

Regarding "game" merely as a pastime carries the risk of mistakenly putting it in contrast with what count as "serious" activities. As a matter of fact, "game" is such a significant part of life that philosophers had to put a great effort to understand and define it. Since Ludwig Wittgenstein, many thinkers have come up with their own definitions of "game," and the discussion still continues today. Arguably, even a predator that plays with its prey can be considered as involved in a game, hence the expression "cat-and-mouse game." In that broader sense, game can be said to exist everywhere in nature, where there is intelligent life. The more intelligent the animal is, the more complex the games become. Therefore, man-made games are much more complex than others found in the animal world.

The complexity of man-made games is a function of game rules. In fact, without rules, it is not possible to talk about a sensible game. Thus, for Bernard H. Suits, "to play a game is to engage in activity directed towards bringing about a specific state of affairs, using only means permitted by rules, where the rules prohibit more efficient in favor of less efficient means, and where such rules are accepted just because they make possible such activity" [7]. As such, games can be categorized in several ways as to their structures and tools required for playing. There are games of chance, competitive games, board games, video games, role playing games, single or multiplayer games, turn-based or real time games etc. Despite their differences, all such games are based on certain rules, which makes having rules a defining characteristic of "game."

Jane McGonigal identifies three more traits shared by all games: a goal, a feedback system, and voluntary participation [8]. Players need a goal to find a sense of purpose in playing the game. In cases of losing one's purpose in real life, the sense of purpose in games can become a plausible substitute,

which may partially explain why some games are dangerously addictive for certain populations, as will be explained below. Secondly, the feedback system, in the form of scores, levels, points etc., keeps players on track by motivating them towards the goal, and enabling them to assess their success rate. This trait also makes it possible to gain experience by trial and error. Finally, voluntary participation entails that all players are fully aware of, and willing to accept the goal, the rules and the feedback system of the game. Being able to take the challenge intentionally, and to quit at any time, differentiates the game from real life, as a safe and enjoyable activity.

### B. Functions of Game

The prevalence of games among intelligent life forms can be explained by their multiple functions. First and foremost, games serve as a practice ground before facing real life challenges. Chasing after a drifting leaf prepares the cheetah cub for a real hunt. Wrestling with siblings helps a young wolf understand what to do when confronted by a true rival in the future. Clearly, the same principle applies when a fighter pilot tests his/her skills in a flight simulator, before taking off for a real dogfight. This simulative function of games is especially evident when "game" is defined as "a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome" [9]. Games also provide a medium for communication and conflict resolution, which is especially important for social animals like humans. In-game behavior usually reflects specific character traits such as competitiveness, honesty, courage etc., helping players know each other better, thus reducing the conflict potential in real life. When conflicts occur, once agreed upon a certain set of rules and regulations, games can bring real-life opponents together in a peaceful setting, and help them translate their hostilities into nonviolent competition. Therefore, although not enough to solve the actual problems between parties directly, games provide an opportunity to vent negative emotions that may pose an obstacle to reaching a reasonable agreement.

### C. Evolution of Game

Because of such functional benefits, games of all kind have been an indispensable part of human life throughout history. Some authors even went as far as to suggest that civilization owes its very existence to the concept of game [10]. That aside, it is a known fact that games have evolved hand in hand with civilization. What started as simple races and primitive board games, grew in sophistication as different cultures came up with different sets of rules and developed a variety of new tools. New games emerged as others disappeared, and some games were combined to create advanced game designs.

This evolutionary process took a dramatic turn in the last quarter of the 20<sup>th</sup> century, as the advent of personal computers in the 1970s was soon followed by the rise of the internet in the 90s. The exponential growth rate of processing power paved the way for realistic graphics rendering, and rapid advances in artificial intelligence. This enabled the creation of sophisticated computer games in many different genres, which



can be played by one or more players using the same computer. Finally, in the 2000s, as dial-up internet steadily gave way to high-speed, broadband connections, a new era of gaming has begun with the creation of advanced VWs, which provide a “play-ground” for many kinds of MMOGs.

### III. A PSYCHOLOGICAL ASSESSMENT OF VIRTUAL WORLDS

VWs are defined as *immersive 3D environments* in which many users are able to interact with each other via the internet [10]. Increasing number of users are engaged in VWs on a regular basis for different purposes from gaming to socializing. In all these worlds, users are able to project themselves into an online setting via an avatar, a 3D body whose appearance and behaviors can be controlled and tailored by the user.

In this virtual space, though the avatars, users can be anonymous or present themselves as a character in which they can play a role as they choose either close to or far away from their ‘real selves’ [11]. In other words, VWs create a new environment that enables the construction and reconstruction of the self [11]. Beyond that, the self can not only be modified but also be multiplied without any limits. Different cultures for different characters can coexist and interact with each other.

Virtual space engagement provides many opportunities to have ‘second chances’ for adults in which they can shape and reshape their lives, work through unsolved identity issues [11] and create a virtual life that they can succeed as they wished to. The users, especially with lower psychological well-being perceive their virtual characters as more favorable than their true personality [12]. In the end, it is a very powerful fantasy knowing that ‘I am not limited with my history and able to create and recreate myself and my life’.

Through character and environment building, control and mastery feelings are established much easier than the real life. Game players are engaged in economic activities, involved in hunting or combat, build friendships, form communities which in the end promise the sense of belongingness [13] and achievement. In that sense, virtual world and the real world are very similar by providing a space that people carry out their everyday activities and experience the feelings like sorrow, happiness, success, satisfaction, surprise, ambition, belongingness, and so on.

There are different ways of manifesting the self in virtual world. Players may reflect their lifestyles, values and attitudes into the virtual space at different levels. Studies show that every game player develops a distinctive lifestyle in virtual environment [14]. They usually act similar to or in parallel with their real value system. Most of the behavior patterns show common properties with the ones in real world.

The relationship between the behavior manifestations of virtual and the real worlds has been a great interest for many researchers, government institutions and radical groups like organized criminals. Among those behaviors, aggression stands out dramatically for many interest groups, especially for the ones that wish to explore the players that they can recruit for their own causes.

Expression of aggression like character attack or ‘illegitimate’ Player Killing and manifestations of gender identity in the online game world might be important clues of the real lifestyles of the players [15].

VWs also provide an environment in which people can communicate with each other by using their avatars. This system allows strangers to establish relationships and get to know each other better through the virtual reflections of themselves [16]. Millions of online players from very different parts of the world are able to communicate through their ‘ideal selves’ in their artificial ‘ideal world.’ This might create an emotional bond and attachment that could be very dangerous with the exploitation of the psychologically disordered people by terrorist groups.

An essential function of VWs is to create a sense of security for its users, which makes them feel free from the constraints imposed upon them by the society in real life. In that sense, a VW constitutes what is called a “magic circle,” a “shield of sorts, protecting the fantasy world from the outside world” [17]. However, that does not mean that VWs are chaotic environments. There are rules to follow, but these are not determined by the outside world. Instead, different MMOG designs come up with their own rules and limitations to be applied in the VWs. In other words, the same relation that exists between the real world and real life, could be said to exist also between VWs and MMOGs.

### IV. MASSIVELY MULTIPLAYER ONLINE GAMES

Online gaming industry with its 400 million active users is a rapidly growing market. According to a report by Gartner, a US based global information technology research and advisory company, online gaming economy would reach approximately 30 billion dollars in 2015 [18]. Credit Cards and e-Wallets are preferred as payment methods by MMOG customers [19]. Market researches point out that, more than 60% of the MMOG players are older than 21 years, and approximately 80% of them are males younger than 35 years [20].

Although many genres, types or categorizations are available on the MMOG market, MMOGs can be examined under three basic categories in terms of their content: First Person Shooter Games (FPSGs), Fantasy Role Playing Games (FRPGs) and Real Life Simulations (RLSs).

FPSGs are played mostly in urban warfare settings and on several maps for different missions, such as neutralizing the enemy, capturing or protecting the base, liquidating individuals, and destroying or maintaining control of a designated area, vehicle, or machinery. Missions with asymmetric warfare themes are held by operators mostly in or around urban areas. FPSGs highly depend on tactical and operational level decision making under duress.

Secondly, FRPGs stay in touch with well-known tabletop games and fantasy literature. Urban spaces and aspects of modern city life become a less popular theme around FRP circles. Abilities are developed by FRP characters throughout their virtual careers. Unlike the reflexive, repetitive, and



normative nature of FPSGs, FRP environment is highly anarchic and depends on operational and strategic decision making.

Thirdly, games defined as RLSs, propose a different experience to their audiences. RLS experience covers most of the civic and civil aspects of human life, including pregnancy and even birth of so-called children. Unlike heavily militarized FPSGs or adventure oriented FRPGs, and their tactical, operational and strategic points of view, RLSs are almost as inclusive as real life as to their in-game dynamics.

#### V. METHODS OF USING MASSIVELY MULTIPLAYER ONLINE GAMES FOR NONGAMING PURPOSES

The aforementioned characteristics of MMOGs make them not only a valuable medium for research in many fields from sociology [21] to transportation engineering [22], but also a useful tool for gathering intelligence, recruitment, and training, no matter who uses them for such purposes, be it government agencies or criminal organizations. In various ways, it is indeed possible to break into the “magic circle,” and build bridges of information and interaction between the VWs and the outside world. The most benign and nonintrusive way is to take part in the MMOGs as a player. If, for instance, a certain avatar in an MMOG is known to be used by an identified real person, that person can be approached in the VWs by using another avatar. This method is identical to a classic HUMINT operation in the real world, but for one difference: avatars are used instead of real life masks.

More advanced methods can be examined under three categories with increasing levels of efficiency: intrusive use of existing MMOG infrastructures, setting up private MMOG servers, and creating specialized MMOGs.

##### A. Intrusive Use of Existing MMOG Infrastructures

The technical infrastructure of MMOGs comprises mainly two elements: servers, and players’ computers. The gaming experience is the product of a continuous and massive information flow between the two elements. Theoretically, it is possible to illegally break into an MMOG infrastructure through either of those elements. Hacking into the computers of players or reaching MMOG server data by either technical or nontechnical means, enables the intruder to collect information on players’ activities in the VW, which can then be used for intelligence purposes. The downsides of this method are that it carries the risk of facing criminal charges if caught, and that it requires advanced technical knowledge, skills, and tools.

##### B. Setting Up Private MMOG Servers

Controlling an MMOG server makes it possible to log all data flowing through that server. Therefore, setting up a private MMOG server enables its owner to record all dialogues and actions occurring in the game. This method does not require as much technical capability as the one above, yet it still carries the risk of being sued by MMOG companies for copyright infringement and other such offenses [23].

##### C. Creating Specialized MMOGs

The most effective method of using MMOGs is creating an MMOG that is specifically designed to serve one or more of the aforementioned purposes. As will be seen, different genres of MMOGs lend themselves to either of those purposes in different degrees. Therefore, being the designer of an MMOG and controlling its servers gives the game owner the best opportunities to use it for nongaming purposes. However, the costs of such an operation are so high that it is virtually unaffordable for all but the very wealthy actors.

#### VI. INTELLIGENCE GATHERING, RECRUITMENT, AND TRAINING THROUGH MASSIVELY MULTIPLAYER ONLINE GAMES

##### A. MMOG as an Intelligence Gathering Environment

Despite their differences, all genres of MMOGs can be utilized for intelligence gathering purposes to certain extents. In one instance, a virtual epidemic spread among the avatars in one of the most popular FRPGs [24]. Soon, what was initially started by the game administrators as a challenge for powerful avatars, unexpectedly turned into a pandemic that began to kill scores of avatars indiscriminately. Unable to solve the crisis in any other way, the administrators had to reboot the VW to save the game. Named after the virtual disease that caused the crisis, the “Corrupted Blood incident” became a research topic for both epidemiologists [25]–[26], and counter-terrorism officials [27], who suggested that the spread of the disease, and the response pattern of avatars bore a close resemblance to real life epidemics.

FPSGs of an ideological leaning can also give valuable information about their owners and players. It is known that in recent years, Hezbollah designed two sequential FPSGs with anti-Israel themes. Neither of them can be regarded as an MMOG: the first one does not have a multi-player mode, and the second one lacks a “persistent world,” that is, a VW that continues to exist independent of the players. Nevertheless, in spite of their rather primitive nature, they do constitute valuable platforms for intelligence, both for Hezbollah and its enemies. The definition given for the second game by a Hezbollah member makes the point: “It is not only a game, it is an education and culture and it is part of the confrontation because the American and the Western companies created games featuring us as terrorists and it is widespread on the market. This achievement is an addition to the tools of resistance and confrontation” [28]. A sequential third game in the form of an MMOG would surely provide an even better tool for intelligence gathering.

However, arguably, RLSs with their comprehensive contents and non-fantastic settings are better suited to intelligence gathering purposes. Phylis Johnson describes one such RLS: “[For] many members, [it] is not an escape from the real world, but an extension of it, particularly when it comes to responding to news reports of world conflict” [29]. The author informs that the RLS servers had to be temporarily shut down because of the influx of pro-Palestinian protesters after the real world violence in Gaza, in early 2009 [29]. The US presidential campaigns are known to be held in RLSs too,

including all the activism in the form of protests, rallies, and discussions [30]–[31]. Thus, in addition to the personal information about players that can be collected from RLSSs, it is also possible to gather intelligence about their political inclinations and actions.

### B. MMOG as a Recruitment Medium

A 2012 report, prepared by the UN, explains how the internet can be used for recruitment purposes: “The Internet may be used not only as a means to publish extremist rhetoric and videos, but also a way to develop relationships with, and solicit support from, those most responsive to targeted propaganda. Terrorist organizations increasingly use propaganda distributed via platforms such as password-protected websites and restricted access Internet chat groups as a means of clandestine recruitment” [32]. The rising popularity of MMOGs among young males, who are usually more prone to rebellious and aggressive behavior, makes MMOGs suitable mediums to find potential candidates for organized violence.

MMOGs are environments where players compete for self-realization through their avatars. This competition and the related gratification/frustration cycle may become dangerously addictive for those who are not content with themselves in the real world. Acting upon the same principle employed by Hasan Sabbah as he promised a false paradise to his desperate followers, such people in search for a more satisfactory and meaningful life can be easily lured into militancy.

Not only terrorist organizations but states, too, are using online video games for recruitment. The US government developed a game called America’s Army for contacting potential recruits, and released it for free on July 4, 2002. Although not exactly a MMOG, since it lacks a “permanent world,” this online FPSG was so successful that it “had made a more positive impression than all the Army’s other recruiting initiatives combined” [33].

### C. MMOG as a Training Tool

Population researches reveal that 53% of the human population is living in urban areas [34]. It is expected that urban population will be increasing to 6.25 billion by 2050 and approximately 80% of that population will originate from the less developed regions of the world [35]. Experiences of Somalia, Fallujah, 9/11 and perpetual street clashes of the Middle East, display that all actors in the power play should be well prepared for an urban warfare environment.

Although some scholars suggest that the violence element of the MMOG experience would not cause a substantial increase in real world aggression [36], it does not mean that MMOGs are not valuable in terms of training for aggressive purposes. Real life disputes about religious, ethnical, or ideological matters are known to generate soft spots in societies. Thus, although aggression may not be a direct outcome of MMOGs, once the psychologically prone individuals are identified and approached in VWs, their aggressive tendencies may be put into action through political indoctrination and/or systematic radicalization. The value of the internet as a medium for propaganda has already been known for some time. As Nico Prucha mentions, a laptop is more than enough for that

purpose [37]. The MMOGs can be regarded as just a new and more effective tool for using the internet in that manner.

However, the use of MMOGs as training tools is not limited to ideological and psychological domains. There are several studies that show the positive effects of playing video games on motor skills such as increased eye-hand coordination, better reaction time, spatial visualization, mental rotation, visual attention etc., and the simulative aspects of gaming “can potentially lead to acquisition of complex real-life skills, such as driving, flying airplanes, and even playing golf” [38]. MMOGs with their interactive VWs that require players to develop their organizational skills in addition to their motor skills, adds a new dimension to the enumerated positive effects of video games.

The FPSG genre of the MMOGs is especially relevant for military purposes. Armed forces personnel, first responders, operators, case officers or insurgents are trained by state and non-state actors with different intentions. Preparing an asset on a specific mission requires scientific method which depends on preparing, testing, evaluation and feedback cycle. On the field, the protocol is simple; an operation is a zero-sum game. In that sense, real time battle simulations against real operators in a FPSG environment would bring invaluable experience to the table. Moreover, Weapons of Mass Destruction (WMD) and concerns about their use for terrorist purposes generate another field for MMOGs. There are studies about using MMOGs as a training tool against WMD’s, done by officers at Naval Postgraduate School (NPS) at 2004 [39] and 2012 [40].

Going beyond the initial purpose of recruitment, more advanced versions of the aforementioned game, America’s Army, have been effectively used for training purposes, as well [41]–[42]–[43]. Yet another project taken by the US government is an advanced MMOG called Asymmetric Warfare Environment, which is specifically designed for training the military personnel, and is not released to the public [44]. It is reasonable to argue that this trend towards virtual training will continue exponentially, as new technological advances pave the way for more daring projects.

## VII. CONCLUSION

As shown in this paper, in today’s fourth generation warfare environment, MMOGs provide a medium that can be effectively used by state and non-state actors for nongaming purposes such as intelligence gathering, recruitment, and training.

At this point, it is important to emphasize that the MMOG industry is a nascent phenomenon that emerged only around a decade ago. Therefore, today’s popular MMOGs are still very limited by the present-day technologies. For instance, there is still a big trade-off between realistic graphics and game play sophistication, because the current processing powers and connection speeds do not allow for a better option.

Another limitation of MMOGs that could be mentioned here is the non-random representation of the real life population in VWs. Considering that the average profile of MMOG players significantly differs from the real world population as to their ethnic background, gender, age, and annual income, MMOGs



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do not lend themselves perfectly to the concerning nongaming purposes.

Finally, it is also worth noting that there are, and probably will always be, some essential differences between VWs and the real world. No matter how much investment is made in an avatar in terms of time, effort, and virtual currencies, the tragedy of losing an avatar in an MMOG will not be comparable to a loss of human life in the real world.

However, as new technologies emerge and the current ones are developed, the distinction between the real and virtual worlds is expected to blur further. Moreover, globalization dynamics in combination with cheaper technologies could lead to a better representation of real world populations in VWs. Therefore, the aforementioned limitations of MMOGs could be expected to decrease in importance as time goes by.

All in all, MMOGs appear to be a promising venue of investment for those who aspire to compete as powerful actors in tomorrow's world.

REFERENCES

[1] H. Morgenthau, *Politics Among Nations: The Struggle for Power and Peace*. Kenneth Thompson (ed.), New York: McGraw Hill, 1985, p. 57.  
[2] W. S. Lind, K. Nightengale, J. F. Schmitt, J. W. Sutton, and G. I. Wilson, "The Changing Face of War: Into the Fourth Generation," *Marine Corps Gazette*, October 1989, pp. 22-26.  
[3] M. Castells, *The Information Age: Economy, Society, and Culture, Vol. I: The Rise of the Network Society*. 2<sup>nd</sup> Edition, United Kingdom: Wiley-Blackwell, 2010.  
[4] P. N. Howard, "The Arab Spring's Cascading Effects," *Pacific Standard* [Online], February 23, 2011. Available: <http://www.psmag.com/navigation/politics-and-law/the-cascading-effects-of-the-arab-spring-28575/>  
[5] H. Kendircioğlu, T. Kaymazlı, A. A. Eker, "Irregular Warfare with Cyber Means," *ISCTurkey 2013 Proceedings*, pp. 274-277, September 2013, p. 276.  
[6] R. Singel, "U.S. Spies Want to Find Terrorists in World of Warcraft," *Wired* [Online], February 22, 2008. Available: <http://www.wired.com/2008/02/nations-spies-w/>  
[7] B. H. Suits, *The Grasshopper: Games, Life and Utopia*. Toronto Buffalo: University of Toronto Press, 1978, p. 34.  
[8] J. McGonigal, *Reality Is Broken: Why Games Make Us Better and How They Can Change the World*. New York: Penguin Press, 2011, p. 21.  
[9] K. Salen and E. Zimmerman, *Rules of Play: Game Design Fundamentals*. MIT Press, 2004, p.80.  
[10] J. Huizinga, *Homo Ludens*. London: Routledge & Kegan Paul, 1949.  
[11] N. Ducheneaut, M.-H. Wen, N. Yee, G. Wadley, "Body and mind: a study of avatar personalization in three virtual worlds," *CHI 2009*, pp. 1151-1160, April 4-9, 2009.  
[12] S. Turkle, "Constructions and reconstructions of self in virtual reality: Playing in the MUDs," *Mind, Culture and Activity*, 1(3), pp. 158-167.  
[13] K. Bessiere, A. Seay, and S. Kiesler, "The ideal elf: Identity exploration in World of Warcraft," *Cyber Psychology & Behavior*, 10(4), pp. 530-535.  
[14] S.-M. L. Whang and G. Chang, "Psychological analysis of online game users," *Proceedings of Human Computer Interaction*, 2, pp. 81-90, 2002.  
[15] S.-M. L. Whang and G. Chang, "Lifestyles of virtual world residents: Living in the online game 'Lineage'," *Cyber Psychology & Behavior*, 7(5), pp. 592-600, 2004.  
[16] K.-K. R. Choo and R. Smith, "Criminal exploitation of online systems by organised crime groups," *Asian Criminology*, 3, pp. 37-59, 2008.  
[17] E. Castronova, *Synthetic Worlds: The Business and Culture of Online Games*. Chicago and London: University of Chicago Press, 2005, p. 147.

[18] Gartner News Release, "Gartner Says Spending on Gaming to Exceed \$74 Billion in 2011," July 5, 2011. Available: <http://www.gartner.com/newsroom/id/1737414>  
[19] Global Collect Research Report, "The Global MMO Games Market: Payments, Intelligence and Trends," July 2, 2013. Available: [http://info.globalcollect.com/Portals/141744/docs/GlobalCollect\\_Global\\_MMO\\_Games\\_Market\\_report\\_03.pdf](http://info.globalcollect.com/Portals/141744/docs/GlobalCollect_Global_MMO_Games_Market_report_03.pdf)  
[20] Newzoo Market Research Report, "MMO Trend Report", November 25, 2011. Available: <http://www.newzoo.com/trend-reports/mmo-trend-report/>  
[21] V. C. Gaziz, "Video gaming: the sociology of a lifeworld," *published PhD thesis*, 2012.  
[22] R. B. Chen, H. S. Mahmassani, H. Yun, N. Contractor, D. Williams, "Travel and activity behaviors in virtual world environments," *TRB 89<sup>th</sup> Annual Meeting Compendium of Papers DVD*, 2010.  
[23] K. Graft, "Blizzard Wins \$88M Judgment Against WoW Private Server Owner," *Gamasutra* [Online], August 16, 2010. Available: [http://www.gamasutra.com/view/news/29936/Blizzard\\_Wins\\_88M\\_Judgment\\_Against\\_WoW\\_Private\\_Server\\_Owner.php](http://www.gamasutra.com/view/news/29936/Blizzard_Wins_88M_Judgment_Against_WoW_Private_Server_Owner.php)  
[24] "Online gamers rehearse real-world epidemics," *Sydney Morning Herald* [Online], August 21, 2007. Available: <http://www.smh.com.au/news/Technology/Online-gamers-rehearse-realworld-epidemics/2007/08/21/1187462217489.html>  
[25] R. D. Balicer, "Modeling infectious diseases dissemination through online role-playing games," *Epidemiology*, 18(2), pp. 260-261, March 2007.  
[26] E. T. Lofgren and N. H. Fefferman, "The untapped potential of virtual game worlds to shed light on real world epidemics," *The Lancet Infectious Diseases*, 7, pp. 625-629, 2007.  
[27] D. Thier, "World of Warcraft Shines Light on Terror Tactics," *Wired* [Online], March 20, 2008. Available: [http://archive.wired.com/gaming/virtualworlds/news/2008/03/wow\\_terr\\_or](http://archive.wired.com/gaming/virtualworlds/news/2008/03/wow_terr_or)  
[28] "Children play Israeli-killers in bloody new computer game," *Daily Mail* [Online], August 17, 2007. Available: <http://www.dailymail.co.uk/news/article-475966/Children-play-Israeli-killers-bloody-new-game.html>  
[29] P. Johnson, *Second Life, Media, and the Other Society*. New York: Peter Lang Publishing, 2010, p. 185.  
[30] A. J. Wharton. (2009, August). Shaping the 'public sphere' in Second Life: Architectures of the 2008 U.S. Presidential Election. *Journal of Virtual Worlds Research* [Online]. 2(2). Available: <https://journals.tdl.org/jvwr/index.php/jvwr/article/view/411>  
[31] C. Kohler, "John Edwards' Second Life Vandalized," *Wired* [Online], March 01, 2007. Available: [http://www.wired.com/2007/03/john\\_edwards\\_se/](http://www.wired.com/2007/03/john_edwards_se/)  
[32] *The Use of the Internet for Terrorist Purposes*, United Nations Office on Drugs and Crime, New York, 2012.  
[33] S. Zeller, "Training Games," *Government Executive* [Online], January 01, 2005. Available: <http://www.govexec.com/magazine/features/2005/01/training-games/18341/>  
[34] World Bank Data on Urban Development, 2013. Available: <http://data.worldbank.org/topic/urban-development>  
[35] United Nations Department of Economic and Social Affairs, "World Urbanization Prospects The 2011 Revision", 2012. Available: [http://esa.un.org/unup/pdf/WUP2011\\_Highlights.pdf](http://esa.un.org/unup/pdf/WUP2011_Highlights.pdf)  
[36] D. Williams and M. Skoric, "Internet Fantasy Violence: A Test of Aggression in an Online Game," *Communication Monographs*, 2005, 217-233, p. 228.  
[37] N. Prucha, "Online Jihad versus Gaming Industry: A Comparative Look at Two Cultural Sub-Groups Online Ventures," *SIAC-Journal*, 2010, 70-80, p. 75.  
[38] J. C. Rosser, Jr, P. J. Lynch, L. Cuddihy, D. A. Gentile, J. Klonsky, R. Merrell, "The Impact of Video Games on Training Surgeons in the 21<sup>st</sup> Century," *Arch Surg.*, 142, 181-186, p. 182.  
[39] T. J. Richardson, "First Responder Weapons Of Mass Destruction Training Using Massively Multiplayer On-Line Gaming," Naval Postgraduate School, California, 2004. Available: <http://www.ntis.gov/search/product.aspx?abbr=ADA425028>  
[40] C. M. Gorman, "Getting Serious About Games-Using Video Game-Based Learning to Enhance Nuclear Terrorism Preparedness," Naval



- Postgraduate School, California, 2012. Available:  
<http://www.hsd1.org/?abstract&did=710287>
- [41] G. Jean, "Game Branches Out Into Real Combat Training," *NationalDefense* [Online], February 2006. Available:  
[http://www.nationaldefensemagazine.org/archive/2006/February/Pages/games\\_brance3042.aspx](http://www.nationaldefensemagazine.org/archive/2006/February/Pages/games_brance3042.aspx)
- [42] N. Ungerleider, "Army Tweaks Recruitment Video Game to Train Soldiers for Real 'Hurt Locker' Situations," *Fast Company* [Online], August 03, 2011. Available:  
<http://www.fastcompany.com/1771044/army-tweaks-recruitment-video-game-train-soldiers-real-hurt-locker-situations>
- [43] C. Boyd, "US army cuts teeth on video game," *BBC* [Online], November 25, 2005. Available:  
<http://news.bbc.co.uk/2/hi/technology/4460082.stm>
- [44] "Spot On: The US Army's There-based simulation," *GameSpot* [Online], April 21, 2004. Available:  
<http://www.gamespot.com/articles/spot-on-the-us-armys-there-based-simulation/1100-6093860/>

