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Opportunities and Risks in Online Gaming Environments

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RESEARCH DEGREES WITH PLYMOUTH UNIVERSITY

Opportunities and Risks in Online Gaming Environments

by

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Abstract

Massively Multiplayer Online Role Playing Games (MMORPGs) have evolved from traditional video games in that they embrace both the technology of the Internet and video games. The massive "exodus" from the physical offline world to online gaming communities brings with it not only a number of unique and exciting opportunities, but also a number of emerging and serious risks.   This research set out to examine the unique opportunities and risks to vulnerable individuals, namely, young adults, teenagers and young children; all of whom are considered by many to be priority groups in the protection from harm. The purpose was to examine the reality of vulnerable individuals encountering these opportunities and risks.

This research combined a number of methodologies supported by underpinning qualitative and quantitative theories. Questionnaires, semi-structured interviews and focus groups gathered information from teenagers, adults and children in order to critically examine the unique opportunities and risks encountered in Massively Multiplayer Online Role Playing Games.

The findings from these interactions identified specific examples of opportunities and risk posed to vulnerable individuals. The findings demonstrated that there was a need for a support and protection mechanism that promoted the identification and awareness of the potential risk among vulnerable individuals. Emerging from these findings was a set of concepts that provided the evidence base for a Novel Taxonomy of Opportunities and Risks in Massively Multiplayer Online Role Playing Game environments that was designed to assist in the assessment of risk. Validation of the proposed taxonomy was achieved by means of

an ethnographic study of (World of Warcraft) online gamers' behaviour and social interactions through unobtrusive video capture of gaming sessions.

The Novel Taxonomy of Opportunities and Risks provided a basis for the development of a proof-of-concept Decision Support System; the purpose of which was to assist both social work practitioners and individuals to identify and reduce risks. Representatives from both user groups were consulted for evaluation of the acceptability of such an approach. Favourable responses from participants demonstrated acceptability of the aforementioned approach. The evaluation process also demonstrated how the prototype would serve as a useful tool to make individual users aware of potential dangers.

This research presents three novel facets: (1) it advances understanding of the unique opportunities and risks within MMORPG environments; (2) provides a framework for the assessment of risks in MMORPGs through the Novel Taxonomy and (3) demonstrates a novel Decision Support System to assist in the identification and reduction of risk through a proof-of-concept prototype.

Table of Contents

List of Figures

List of Tables

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Author's Declaration

At no time during the registration for the degree of *Doctor of Philosophy* has the author been registered for any other University award without prior agreement of the Graduate Sub-Committee.

Work submitted for this research degree at the Plymouth University has not formed part of any other degree either at Plymouth University or at another establishment.

A programme of advanced study was undertaken, which included the extensive reading of literature relevant to the research project and attendance at international conferences on Human Computer Interaction, Security, Internet and E-Safety. Paper review work was also undertaken at both international conference and scientific journal levels.

Relevant scientific seminars and conferences were regularly attended at which work was often presented. A 3 month visiting research scholarship was undertaken at Nanyang Technological University in 2010.

Publications (or presentation of other forms of creative and performing work):

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Journal of Virtual Worlds Research, vol. 3, no. 3, ISSN: 1941-8477, 2011

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Chapter 1: Introduction

1.1 Introduction

This chapter introduces the context of this research, by exploring the evolution of Massively Multiplayer Online Role Playing Games (MMORPGs) together with their impact on social communication and connections. The potential for opportunities and risks in online gaming environments are also introduced. The aims and objectives of this project are defined and the chapter concludes with a summary of the thesis structure.

"These computers on our desks are turning into portals to other realms of existence…realms that will one day be preferred to earth.

Practical virtual reality emerged unannounced from the dark imagineering labs of the video game industry, got powered by high-speed Internet connections, and exploded across the globe, catching us all by surprise. Already, practical virtual reality immerses 20 or 30 million people in worlds of perpetual fantasy. Over the next generation or two, hundreds of millions will join them.

The exodus of these people from the real world, from our normal daily life of living rooms, cubicles, and shopping malls, will create a change in social climate that makes global warming look like a tempest in a teacup" (Castronova, 2007, p.251).

Social contact with other individuals creates important instrumental and socioeconomic benefits (Burt, 1992; Coleman, 1988). Membership and networks in voluntary associations and organisations help to maintain democratic institutions and enhance personal well being (Putnam, 2000). Our interpersonal environment is changing with collective activities such as family dinners and participation in recreational sport witnessing a significant decline over the last few decades. Putnam (2000) asserts that the rapid adoption and diffusion of media technologies, such as television, has weakened social capital as people are watching more TV, watching it more habitually, pervasively and alone. These media technologies have also created a shift change in communication preference. People communicate with friends and family using email, instant messengers and voice over IP applications, keep up-to-date with latest events in their social circle using social networking websites such as Facebook and Twitter and interact with other like minded individuals in recreational and information online arenas (Preece & Maloney-Krichmar, 2005; Boyd & Ellison, 2007).

Within both the online and offline domains, people experience different opportunities and risks. As Livingstone and Haddon (2008) assert, opportunities are widely judged to include learning, communication, creativity, expression and entertainment – a heterogeneous set of activities for which there is considerable optimism and public/private sector provision. Conversely, risks also encompass a heterogeneous of intended and unintended experiences, including encountering pornography, self-harm, violent, racist or hateful contact via grooming or harassment and problematic conduct among peers such as bullying or privacy invasions of one kind or another (Livingstone and Haddon, 2008).

Massively Multiplayer Online Role Playing Games (MMORPG) [1] is one such computer mediated community that has become an increasingly popular domain of much social, cultural and economic significance (Griffiths, 1997; Yee, 2006; Castronova, 2007). MMORPGs are unique, persistent (in that they exist even when the user has logged off), fully immersive 3D environments housing millions of players who engage in goal-orientated gaming activities as well as social interactions through the control of characters known as "avatars" (Yee, 2006; Castronova, 2005; Cole and Griffiths, 2007). MMORPGs are highly social arenas which enable users to interact with both the environment and other players via multiple communication channels. Structural characteristics of MMORPGs differentiate these environments from other typical computer mediated environments such as chat rooms or text based web forums as they combine comprehensive user control, multimedia and interactivity to create an immersive platform that is almost identical to complex physical environments. Furthermore, MMORPG worlds allow gamers to lead virtual lives in developing their avatars, collecting and crafting new weapons, slaying dragons and creating and sustaining short and long term social groups.

The rapid emergence and embrace of MMORPGs and virtual worlds is otherwise described by Castronova (2007) as an "exodus" of people seeking to "disappear from reality" to join millions of other avatars in exploring and inhabiting these ever expanding virtual arenas. Estimated figures show that there are more than 500 million online gamers worldwide (McGonigal, 2011) with 43 million online gaming accounts in the West (White, 2009), and

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[1] In this thesis, MMORPG's do not include free-roaming open worlds such as Second Life. Free-roaming virtual worlds facilitate a greater level of freedom for participants. There are no pre defined goals created by the software developer and players are provided with a set of tools to create their own version of the world. Social, non immersive games such as Farmville which are built on pre-existing social platforms (i.e. Facebook) are also excluded.

possibly double this figure in Asia. Lenhart et. al. (2008) report that 43% of all adult gamers play online based games with 21% of all teen gamers playing MMORPGs. Furthermore, McGonigal (2011) asserts that on average 3 billion hours a week are spent playing online games with active online gamers estimated to spend 10,000 hours playing MMORPGs by the time they reach 21. Throughout the online gaming community, MMORPG players are particularly active and engaged as research shows gamers spend on average 22 hours per week playing online (Yee, 2006) with nearly half (49%) playing every day or almost every day. In comparison, UK Internet users spend an average of 14 hours online per week (Phillips, 2010), significantly less than their gaming counterparts (UKOM, 2011).

The basic human demand for social connection has never changed; however, some argue that the decline in social capital amongst physical communities may have prompted an increasing number of people to create fresh and maintain existing social ties in virtual communities (Young, 2006; Wellman, 2001). MMORPGs are one of the most popular, sophisticated and complex categories of virtual communities and as such, are important environments to examine. Asides from investigating motivations for engagement, it is equally important to study the myriad of opportunities and risks faced by participants in the MMORPG environment.   What benefits and opportunities does participation in the MMORPG environment bring to gamers? What are the positive and negative implications for both the individual and society of this rapidly increasing exodus to the virtual world? What new and emerging risks are players confronted with?   And finally, how can these emerging opportunities and risks be identified and assessed?

To date, research on the prevalence of opportunities and risks in MMORPG environments remains relatively sparse; however, empirical research has amassed on the two platforms that MMORPGs are built upon: the Internet and video games. The social and psychological impacts of the Internet have both been topics of extensive research since the inception of the World Wide Web in the late 1980's and the beginning of its rapid adoption in the 1990's. These aspects of the Internet remain subjects of much debate due the contrasting findings of researchers (Kraut et. al, 1998; Oqvist, 2009; Paechter and Maier, 2010). On the one hand, researchers have long since voiced concerns about the impact of the Internet on family life and the privacy risks associated with the disclosure of personal and sensitive data (Nie, 2001, Oqvist, 2009). In contrast, others highlight the potential social and educational benefits of the World Wide Web (Milne and Culnan, 2004; Ellison et. al. 2007). The Internet enables users to not only communicate with family and friends both locally and over long distances, but also facilitates the formation of new social networks with like minded people who share the same values and interests (Wellman, 2007).

Video games have long since been a popular subject of academic interest with a large body of research focusing on the possible negative impacts such as behavioural addiction (Griffiths and Hunt, 1995; Lemmens et. al, 2009) and the consequential effects on individual's physical and mental health (Anderson, 2004). Common public perceptions of the young, socially challenged male gamer stereotype have been exacerbated by the mass media; however, more recent studies reveal a greater level of participation of females as well as gamers from a wide range of ages (Williams et. al, 2008; Griffiths; 2005). Positive opportunities have emerged with video games being used as a pedagogical tool for educators (Squire and Jenkins,

2011) and players seeking and obtaining social and emotional support from other like minded participants (McGonigal, 2011; Chen et. al, 2008).

Massively Multiplayer Online Role Playing Games have evolved from traditional video games in that they embrace both the technology of the Internet and video games. Indeed, the role playing fantasy theme found in the majority of modern MMORPGs is not a new phenomenon. The main attraction of online games for millions of participants has been identified as the ability to play with or against other humans (represented by avatars) as opposed to artificial opponents controlled by the game. Therefore, the juxtaposition of social interaction and fantasy role play are arguably the key elements which make MMORPGs so attractive and successful. To this end, MMORPGs have been described as "synthetic worlds" and "virtual third places" (Steinkuehler and Williams, 2006; Ducheneant et.al. 2007) where participants can socialise and maintain social networks whilst sharing (sometimes highly emotive) experiences and completing collaborative and solo tasks in three dimensional computer generated physical spaces (Castronova, 2007).

The massive "exodus" from the physical offline world to online gaming communities brings with it not only a number of unique and exciting opportunities, but also a number of emerging and serious risks. What new opportunities can be found in MMORPGs and how can these be maximised? What new risks are emerging in these unique environments and how can they be identified? And finally, are the same opportunities and risks previously identified in other computer mediated communities (e.g. instant messengers, forums and social networking sites) inherent in MMORPG worlds? There is a distinct lack of empirical data concerning

emerging opportunities and risks in MMORPG environments and current findings are far from conclusive.

Qualitative studies have explored the social interactions and roles of gamers (Christou et al., 2013; Chen et. al. 2008; Nardi, 2010), and survey studies have revealed that many players are motivated by the social factor of MMORPGs (Yee, 2006; Griffiths et. al. 2004). Existing literature surrounding the plethora of opportunities and risks in Internet based communication platforms (e.g. instant messengers, forums, social networking sites) highlights the potential manifestation of opportunities and risks through peer-to-peer interaction (Hasebrink et. al. 2009; Livingstone and Helsper, 2009). With this in mind, there is a clear requirement for evidence based research on the opportunities and risks of social interaction in MMORPG environments.

This thesis critically examines the opportunities and risks in Massively Multiplayer Online Role Playing Game environments encountered by vulnerable individuals. The research seeks to reduce the propensity of harm from interaction in MMORPG environments through the identification of risks and the development of a novel technological decision support tool for social workers, whose professional role is to safeguard vulnerable individuals. A vulnerable individual is defined as someone who is unable to protect themselves against significant harm or exploitation (Newham London, 2016). In the context of this thesis the term 'vulnerable individuals' refers to persons who are commonly perceived to be the least resilient to risk, encompassing children, adolescents and vulnerable adults (Daniel, 2010). Each of these groups (children, adolescents and vulnerable adults) are explored further throughout the thesis. It is important to note that the extent of harm arising from a vulnerable individual's

encounter with an identified risk varies and is dependent on the context and nature of such an interaction.

The study is situated in the most popular MMORPG (at the time of writing): World of Warcraft (WoW). The results collected throughout this project embrace both quantitative and qualitative research methods. Two comprehensive survey studies were delivered to European and Asian online gamers to assess two commonly acknowledged risks, data disclosure and addiction. Juxtaposed with a thorough examination of current literature these findings served a useful evidence base for the development of a novel taxonomy of opportunities and risks in online gaming environments. Validation of the proposed taxonomy was achieved by means of an ethnographic study of (World of Warcraft) online gamers' behaviour and social interactions through unobtrusive video capture of gaming sessions. This dataset gives an exceptional opportunity in online gaming research to advance understanding of how behaviour, demographic attributes, motivations, social contact, addiction and structural characteristics of online games give rise to a myriad of opportunities and risks in MMORPG environments. Furthermore, the evidence base enabled a critical re-evaluation of the opportunities and risks in online gaming environments identified in previous literature.

1.2 Aims and objectives

The aim of this research has been to define, design and validate a novel taxonomy framework that can assist social work practitioners, individuals and game developers to identify and manage the opportunities and risks in Massively Multiplayer Online Role Playing Games. This

has been achieved by exploring the opportunities and risks encountered by selected individuals and incorporating that understanding into the novel taxonomy.

In order to achieve the aforementioned aim, the following objectives were defined:

1. To gain a clear evidence-based understanding of opportunities and risks in online gaming environments;

2. To develop a novel taxonomy framework to assist in the identification and assessment of opportunities and risks in online gaming environments;

3. To refine the proposed novel taxonomy framework using an ethnographical and survey evidence base;

4. To develop a novel Decision Support System based on the taxonomy framework which is evaluated by selected user groups in order to gain an understanding of the acceptability of such a solution

The first objective provides a clear understanding of the opportunities and risks to some individuals in online gaming environments based on grounded evidence. Building on this evidence-based understanding, a comprehensive argument is put forward for the need to classify and re-evaluate the opportunities and risks in MMORPG environments.

The second objective incorporated the understanding of opportunities and risks into a novel taxonomy framework to facilitate future opportunity and risk assessments.

The third objective made use of an ethnographical study juxtaposed with the original survey evidence base to refine the proposed novel taxonomy framework to ensure the incorporated opportunities and risks were supported by grounded evidence.

The forth and final objective evaluates the acceptability of the proposed novel taxonomy framework through a practical proof-of-concept implementation. The proof-of-concept implementation was evaluated by a select user group to assess the acceptability of the solution.

1.3 Chapter Breakdown

Chapters 2 and 3 situate this research by exploring the two complex platforms which MMORPGs are built upon: the Internet and video games. Chapter 2 critically reviews the opportunities and risks encountered in online interactive environments, examining the juxtaposition of privacy, social interactions and relative anonymity. Consideration is also given to the educational and commercial opportunities.

Chapter 3 begins by exploring the social interaction and formation of online communities in MMORPGs. The structural characteristics are discussed and consideration is given to the influence of game mechanics and character attributes on social interaction and guild formation. The chapter goes on to investigate the opportunities and risks highlighted in previous literature together with a discussion on the resultant potential for harm. The chapter concludes with a series of research questions that emerged from a review of the evidence base.

Having established the need to investigate the opportunities and risks in online gaming environments in greater detail, chapter 4 re-examines the two most commonly researched aspects of MMORPGs: addiction and data disclosure. The chapter begins by examining the relevant current literature on behavioural addiction and reward cycles. Player behaviour and psychological needs satisfaction is also explored. The chapter proceeds to discuss the quantitative findings of two survey studies which form the foundations of the evidence base for this thesis and partially addresses the first objective.

Chapter 5 explores the opportunities and risk in online gaming environments through qualitative research methods and presents the findings of a series of focus group studies investigating individuals' perceptions and experiences of opportunities and risks in MMORPG environments.

Building on the juxtaposition of previous research and findings from the quantitative survey studies and qualitative focus groups, chapter 6 presents the second objective, a novel assessment taxonomy of opportunities and risks in MMORPG environments. Chapter 6 begins by reviewing the evidence base and critiquing relevant existing taxonomies. Opportunities and risks emerging from the evidence base are discussed together with an exploration of identified contextual variables. The chapter begins with a discussion of the chosen epistemological approach and examines the relevant qualitative research methods. The taxonomy is validated through an ethnographical study of participant behaviour in online gaming environments. The chapter continues with a thorough analysis and discussion of the findings and presents the third objective by using the findings of the ethnographical study to refine and validate the contents of the novel assessment taxonomy.

Chapter 7 incorporates the novel assessment taxonomy into a practical proof-of-concept prototype assessment tool for social work professionals. The design objectives and functionality requirements of the assessment tool are discussed along with a critique of current state-of-the-art assessment systems. The implementation process is described and the chapter concludes with an evaluation of the prototype with two different user groups. The evaluation method and criteria is described and the findings from the evaluations are presented. The chapter concludes with a discussion of the implications surrounding the implementation of the prototype.

Chapter 8 presents the main conclusions emerging from this body of work, highlighting the key achievements whilst acknowledging the limitations. Consideration is given for further research in the field and the importance of the work presented herein is reiterated. The thesis presents a number of appendices in support of the main discussion. In addition, the aforementioned appendices also contain a number of published academic papers arising from the presented research.

Chapter 2: Opportunities and Risks Online

This chapter provides a background for this research by examining the literature surrounding one of the two key platforms that MMORPGs are built upon: the Internet, with a specific focus on the opportunities and risks encountered in the online domain. The chapter begins by exploring these opportunities and risks as well the contextual variables that are likely to affect a vulnerable individual's online experience. The chapter concludes with a review of relevant social interaction theories and their potential affect on the probability of opportunity and risk.

2.1 Background

Since the advent of the World Wide Web in the early 1990's, followed by the commercial release of web browsers between 1993 and 1994, the Internet has rapidly expanded with 77% of all households in the United Kingdom having an Internet connection in the home (ONS, 2015; Joinson, 2007). The widespread introduction of broadband increased both the speed at which information online could be accessed and the range and sophistication of available content (Enabulele, 2008). Over the last decade the Internet has evolved, offering a plethora of activities, opportunities and benefits to users to advance their own goals and understanding (Davies, Coleman and Livingstone, 2015).

The vast and diverse range of digital resources enables individuals to learn, explore, develop, entertain and communicate regardless of their geographical location. Opportunities to meet new people, enhance knowledge and entertain oneself are no longer constrained by physical transportation costs, distances, time and money (Giovannetti et. al. 2007; Livingstone and Haddon, 2009). The Internet has also been praised for the empowerment of marginalised and minority users; enabling people to impart their views to the world, regardless of race,

gender, sexuality and income (Mehra et al. 2004). Recent examples include women's rights to free expression during the 2009 Iranian elections, whereby Iranian women used social networking website Twitter to incite social change within their country (Nemati, 2010). Esarey and Qiang (2011) highlight another example illustrating how digital media technologies have influenced the transformation in the properties of political communication in China.

The many hopes and fears regarding the opportunities that the Internet can offer, together with the associated risks has attracted considerable attention (Wolak et al., 2006; Buckingham, 2004). This has prompted some researchers to question the degree to which, in practice, individuals take up the opportunities and beneficial uses offered by the Internet. According to Livingstone and Helsper (2009), opportunities for children commonly fall into the following categories: learning, communication, participation, creativity, expression and entertainment, all of which continue to be focal points of public and private sector organisations. In contrast to these opportunities is the concern of encountering risks online, including the types of risks, who are most likely to encounter these risks and the factors that could help mitigate risk. Commonly acknowledged risks to children encompassing both intended and unintended experiences include encountering pornography, self-harming, violent, racist or hateful content online, inappropriate or potentially harmful contact through grooming or harassment and, attracting recent attention, problematic conduct among peers such as cyber bullying, 'happy slapping' or privacy invasions of one kind or another (Ybarra, 2005; Livingstone and Haddon, 2008; Atkinson et al., 2007; Liau et al., 2005).

Cyberpsychologists (Joinson, 2003) highlight the effects of technology on communication pointing out that if communication is mediated the outcome is likely to be different to a

greater or lesser degree. In the context of the Internet, the use of online tools has invoked a change in thinking about and approaching a given task, resulting in unimagined wider social changes. Experiments have shown that online interaction can foster social inclusion of individuals suffering from social anxiety (Caplan, 2007; Steinfield et al. 2008) and psychological studies claim that this form of interaction can lead to an improvement in the quality of relationships.

The Internet continues to serve as a platform for a plethora of new tools, experiences and opportunities. New online tools offer unique forms of engagement, interaction and interpretation for end-users. In contrast, research findings suggest that these same platforms create emerging avenues for exploitation, misinterpretation and negative consequences. This chapter continues by exploring in detail the current opportunities and risks that can be found online together with a review of the influences affecting a vulnerable individual's online experience.

2.2 Opportunities

Online opportunities refer to positive experiences facilitated by the Internet. There is a reasonable body of evidence which suggests that individual's online experiences, to a greater or lesser degree, fall into one of the following categories:

- Education and personal development

- Entertainment

- Business and commercial

- Innovation and creativity

- Communication and social networking and;

- Support services

The exact number and types of opportunities available online at any given time is somewhat of a moving target, however, as a starting point, Hasebrink et al. (2009) identified 13 opportunities found on the Internet by EU children.

Access to global information	Community involvement/activism
Educational resources	Technological expertise and literacy
Social networking for old/new friends	Career advancement or employment
Entertainment, games, fun	Personal/health/sexual advice
User-generated content creation	Specialist groups and fan forums
Civil or political participation	Shared experiences with distant others
Privacy for expression of identity	

Table 1: Online opportunities: EU Kids Online (Hasebrink et al. 2009)

The opportunities set out in Table 1, however, do not exclusively apply to children but equally apply to the adult population. Using the abovementioned categorisations, a thorough exploration of online opportunities is presented and discussed.

2.2.1 Social Networking for Old/New Friends

Millions of people are using social network sites (SNS) to connect, meet and share (Boyd and Ellison, 2007). Social networking sites typically provide users with a profile space, facilities for uploading content (e.g. photos and music), messaging in various forms and the ability to make connections to other people. These connections, (otherwise known as 'friends') are the core functionality of an SNS (Donath and Boyd, 2004; Ellison et. al. 2006). For a growing number of Internet users, maintaining a profile on a social networking site has become an integral part of their everyday life with 91% of 16 to 24 and 18% of over 65 year olds having participated on sites such as Facebook and Twitter (ONS, 2015).

Whilst the majority of SNS participants are teenagers, students and young professionals who predominately use social networking to stay in touch with friends, specialised social network sites, such as LinkedIn, are targeted towards specific user groups such as professionals; highlighting that social networking can provide value to many types of users, in a variety of different ways (Vascellaro, 2007).

Social networks have been acknowledged for serving a number of functions in offline life, including providing users with social and emotional support, information resources and ties to other people (Stafford et. al. 2004). Social networks have been found to provide similar kinds of support in online communities (Ellison et. al. 2011; Steinfield et. al. 2008) with users embracing social networking for emotional support and as a resource for information. In both the online and offline contexts, online social networks can provide users with social capital (Ellison el. al. 2011).

Social networking websites also serve a number of other purposes and accommodate different motivations for use (Joinson, 2007). The most popular social networking site at the time of writing was Facebook with 845 million monthly active users in December 2011 (Facebook, 2012). Lampe et. al. (2011) categorised the use of Facebook as either for 'social searching' - information searching about offline contacts and 'social browsing' – using the site to develop new connections, sometimes with the aim of future offline interaction. Results from a survey of 2,000 students found that the primary use of Facebook was for social searching. Wise et. al. (2010) reinforced these findings in their study which monitored emotional responses during social information seeking on Facebook.

Turkle (2011) asserts that the popularity of social networking is fundamentally driven by the following three factors:

- People can control where they place their attention and the duration;

- To always be heard and;

- Never having to feel alone – a constant sense of feeling 'connected' to others

Boyd (2009) states that the underlying dynamics of teen culture has not changed whilst Livingstone and Brake (2010) point out that social networking provides an opportunity for self-expression, learning and communication. This is echoed by Boyd and Ellison (2007) who state that social networking has facilitated changes in the quantity and quality of communication through the affordances of:

- Ease, speed and convenience of widespread access and distribution of content;

- Connectivity throughout a near-global network;

- The persistence and searchability of content over time;

- The facility to replicate, remix and manipulate content, and settings for managing conditions of privacy, anonymity and exchange

In addition, according to Livingstone (2008, p.5), "many teenagers find that social networking enables them to overcome the embarrassments of face-to-face communication as they afford asynchronous, noncommittal, playful interaction in which the management of 'face' and negotiation of flirting, misinterpretation and innuendo is more controllable".

From an educational perspective, SNS advocates believe that social networking can assist in the development of key transferable social and technical skills (Ito et. al. 2008; Crook and Harrison, 2008).

Social networking has become one of the most popular activities online and has experienced phenomenal growth both in terms of popularity and revenue (Facebook, 2012). Indeed, the rapid rise of social network sites has caused a shift change in communication preference, creating new opportunities for users.

2.2.2 Entertainment, Games, Fun

Exactly what activities can be encompassed into entertainment, games and fun is somewhat of a moving target, however, entertainment and fun are commonly defined as "being provided with amusement or enjoyment" and games as "a form of play or sport which is

typically competitive in nature, played according a set of rules with the outcome decided by skill, strength or luck" (Oxford Dictionary, 2012).

Consumption of multimedia entertainment is particularly popular with 71% of American citizens reported to watch videos on websites such as TED.com and YouTube (Pew Internet and American Life Project, 2012). In August 2011, BBC iPlayer received a total of 131 million online requests, 91 million TV requests and 40 million Radio requests (BBC iStats, 2011). YouTube (2012) reported that over 4 billion videos are viewed a day and over 800 million unique users visit the site each month illustrating the popularity online television and radio channels.

In addition to the streaming of multimedia content, many users enjoy the facilities of downloading digital media with Melanson (2011) reporting that a total 16 billion songs has been downloaded from Apple's iTunes since its inception.

E-books provide yet another form of entertainment providing Internet users with access to a millions of publications in one central location. Indeed, Young (2011) notes that "printed publications of books are in decline, whilst e-book outlets are skyrocketing". To this end, Google eBooks reported reaching a total of 2.5 million downloads in May 2011 (Young, 2011). Interactive (or 'enhanced') e-books (ePUB3) incorporate the use of video, audio and animations enabling readers to immersive themselves in the storyline and in the case of a number of chemistry publications, simulate the effects of different experiments (Gonzalez, 2010).

The Internet has not only become a common means for information and communication but also for the trading of goods and services. Nielsen (2014) reported that over 875 million

consumers had shopped online (representing 85% of the world's online population); an increase of 40% in the preceding 2 years. In the U.K. Internet retail sales accounted for 10.5% of all retail sales in 2011 (Coetzee, 2012), illustrating the impact of the Internet on the retail market. According to research by Invesp (2011), people prefer to shop online for a multitude of reasons including saving time (73%), greater variety (67%), easy price comparisons (59%), no crowds (59%) and cheaper prices (55%). The online retail market has undergone exceptional growth with online sales on Amazon.com reaching $34,200,000,000 in 2011 (Demery, 2012), and the global customer base at eBay.com reaching 233 million (eBay Worldwide, 2012).

Gaming today is a widely recognised part of our cultural landscape and has evolved from an activity of solitude and individualism to one of phenomenal online social interaction. Traditional multiplayer games required people to be playing on the same computer or console with controllers physically attached to the same device (Livingston, 2011). The widespread introduction of broadband prompted the explosion of online games, attracting a larger demographic through the incorporation of social media.

Online games have evolved, utilising the Internet as a new gaming forum that actively encourages and in some cases enforces collaboration between millions of player's geospatially apart from one another. Massively Multiplayer Online Role Playing Games (MMORPG) are one of the most interesting innovations in the area of online video gaming, which have advanced from the text-based multi user dungeons (MUDs) offering rich three dimensional worlds populated by thousands of players (Griffiths et.al. 2003). Players in MMORPG arenas explore a developer-created world and work towards pre-programmed

goals whilst offering gamers new forms of social interaction in which team work and problem solving are integral parts of the playing experience (Hussain and Griffiths, 2008). Players can explore a range of identities through the creation of a character (otherwise known as an "avatar) typically with customisable attributes such as gender, race, profession and morality (Eatough et. al. 2006).

Virtual worlds are another popular genre of online gaming which, in contrast to MMORPG's, gives users the tools to create their own version of the world at will. Virtual worlds (e.g. Second Life) are fully immersive three dimensional environments in which 'residents' can meet others, socialise and participate in individual or group activities. Users typically interact through fully customisable avatars and experience living in a world different to that of real life (Second Life, 2012).

The popularity of MMORPGs and virtual worlds continue to grow at exceptional rates with World of Warcraft reporting a total 10.3 million subscribers in 2011 (BBC News, 2011) and Second Life attracting just over 16,000 new user registrations per day in the same year (Second Life, 2011).

Millions of people immerse themselves in massively multiplayer games such as World of Warcraft and Everquest, strategy games like League of Friends and social media games such as Farmville. Radnoff (2011) points out that games not only provide entertainment but also satisfy peoples need to interact compete and exercise their imagination. To this end, Radnoff (2011) attributes the success and popularity of online games to their ability in accommodating

different player motivations; defined as: immersion, cooperation, achievement and competition.

2.2.3 User-Generated Content Creation

User-Generated Content (UGC) comes from people who voluntarily contribute data, information, or media that appears, typically online, before others and is useful or entertaining (Krumm et. al. 2008). The use of such content has seen exceptional growth in recent years which is partly due to the vast majority being supplied by users free of charge. UCG sites have created new viewing patterns and social interactions, empowering users to be more participative, creative and expressive as well as developing new business opportunities (Cha et. al. 2007).

Wunsch-Vincent and Vickery (2007) propose the following main characteristics when defining User-Generated Content:

- **Publication Requirement**

  The UGC should be published in some context where it is publically accessible; for example on a website or social networking site which is accessible to a selected group of people.

- **Creative Effort**

  Users must add their own value to the work illustrating a certain amount of effort was put into the creation or adaption of existing content to construct something novel.

- **Creation Outside of Professional Routines and Practices**

  User-Generated Content is generally created outside of professional routines and practices. It often does not have an institutional or commercial market context and is produced without the expectation of profit or remuneration.

User-Generated Content appears in many forms on the Internet including text, images, audio, video, customer reviews/feedback, educational content, mobile content, virtual content and citizen journalism. UGC creation is facilitated by a plethora of distribution platforms such as blogs (e.g. Blogger.com), wikis (e.g. Wikipedia.org), feedback-enabled sites (e.g. Amazon), grouped based aggregation (e.g. delicious.com), podcasting, hosting sites (e.g. YouTube, Flickr), social networking sites (e.g. Facebook), virtual worlds (e.g. Second Life), news websites (e.g. BBC News) and file sharing sites (e.g. MegaUpload) (Chia, 2012).

George and Scerri (2007) assert that UGC has resulted in users gaining unprecedented power online to initiate and influence change on various social, cultural, political and economic issues in the offline world; view and opinions which were previously disenfranchised by the corporate media (Leung, 2009). Examples of the power of UGC include ousting a sex predator from public office, exposing inappropriate behavior resulting in election defeat, influencing musical and artistic tastes, detailing first-hand accounts of war, influencing book readers on a national and international scale and creating global celebrities. Findings from an empirical study by Qiang et. al. (2011) on the impact of user-generated reviews on online bookings revealed that a 10% increase in traveler review ratings boosted online sales by more than 5%, illustrating the direct influence of user-generated content on sales performance.

The power shift caused by user-generated content in which consumers and end-users are in charge of their media experiences raises the question of what motivates users to create such content (McQuail, 2000).

2.2.4 Privacy for Expression of Identity

It is commonly acknowledged that online platforms provide a space in which people can experiment with and express their identity (Turkle, 2011; Valkenburg, 2005). Early Internet research (e.g. Douglass, 1997) established that people adopt multiple and varied identities in virtual spaces like chat rooms and online games; identities, that in some instances have little connection to individuals' offline lives. According to Davis (2009), while the technology has made it possible to fashion diverse and fluid identities, the motivation to do so, is propelled by the feeling of anonymity that is fostered by some forms of computer mediated communication. Joinson (2003) notes that such affordances of anonymity are complimented by a corresponding perceived lack of accountability in online interactions.

More recent research suggests that online identities are perhaps not so multiple, fluid, or disconnected from offline contexts as originally hypothesised (Davis, 2010, Hardey, 2008). Vasalou and Joinson (2009) found that when asked to create three personal avatars for three different sites, study participants tended to construct avatars that reflected their offline identities regardless of whether the online environment was described as blogging, dating, or gaming site. Similarly, an ethnographic study by Kendall (2011) of the online forum BlueSky revealed that participants strived to fashion online identities that were consistent with and connected to their offline identities.

In some cases, online identities are so rooted in offline contexts that they require knowledge of those contexts in order to be interpreted. For example, Boyd (2011) has described adolescents' practice of 'social steganography,' or hiding in public, on social network sites like Facebook. She explains how youth often phrase public messages in such a way that only their friends will understand their meaning. These messages might contain abbreviations or song lyrics that hold a particular meaning for a group of friends. Someone unfamiliar with these references, such as a parent, might infer an entirely different meaning from an exchange between two friends than the friends themselves. Such an example illustrates how online identities are sometimes not merely consistent with but actually dependent upon offline identities.

Livingstone (2008) notes that younger teenagers relish the opportunities to continuously recreate a highly decorated, stylistically elaborate identity; in contrast to older teenagers that favour a plain aesthetic that foregrounds their links to others, thus expressing a notion of identity lived through authentic relationships.

As Krassner (2010) points out, adolescence continues to be a time for self-exploration and disclosure, and the Internet offers teenagers an additional outlet for identity expression.

2.2.5 Technological Expertise and Literacy

Children and young people are harnessing the vast power of the World Wide Web and digital media to explore, connect, create and learn in different ways never before imagined. Indeed, young people's lives are increasingly mediated by information and communication

technologies, at school, at home and in the community (Livingstone and Helsper, 2007). Ofcom (2014) asserts that the average six-year-old child understands more about digital technology than a 45-year-old adult. Furthermore, more than half of children aged 6-15 claim to use and know a lot about smartphone and tablet apps, with only 3% having never heard of them.

In their latest report, Ofcom (2014) devised a "digital quotient" (DQ) test, which measured 800 children and over 2000 adults. The test measures awareness and self-confidence around gadgets from tables to smart watches, knowledge of superfast Internet, 4G mobile phone networks and mobile apps. Results form the study found that among six to seven year olds, who have grown up with YouTube, Spotify music streaming and the BBC iPlayer, the average DQ (digital quotient) score was 98, which was higher than the those aged between 45 and 49, who scored an average of 96. According to Garside (2014) digital understanding peaks between 14 and 15, with a DQ of 113, and then drops gradually throughout adulthood, before falling rapidly in old age.

The last two decades has witnessed the evolution of digital technologies in the classroom and Garside (2014) states that the introduction and rapid embrace of broadband facilitated one of the biggest shift changes in communication methods. Andrews (2013) discusses the beneficial use of iPads in the classroom with children as young as 11 years, asserting that young people use these technologies to improve basic numeracy and literacy skills in addition to learning fundamental app development skills.

It is commonly acknowledged that technology is an integral facet in all aspects of young peoples lives, with children who grew up in the post millennium era becoming digital natives from the grassroots level. Naace (2014) explored the use of iPads in a secondary school (11-18 years old) setting. Their results found that an overwhelming majority of teachers regularly use iPads in their teaching and that students were more motivated to learn when using iPads. Credit was given to this technology for the enhanced level of homework, progression, collaborative working and decreased costs.

In 2011, the UK was found to be Europe's most digitally aware nation with people in the country spending an average of 746 minutes a week online, longer than any of the leading economies except for the United States of America.

The Internet provides a wealth of opportunities for young people and adults alike housing a multitude of platforms for users to develop on a personal and professional level.

2.2.6 Career Advancement or Employment

Career development is a term that describes two linked concepts. Firstly, it describes a process of moving through life, learning and work that individuals are undergoing with varying degrees of consciousness, purposefulness and support. An individual can be said to be developing their career without seeking help. Hooley (2012) posits that the Internet and associated technologies reframe the way in which individuals develop their careers. Indeed, over the last two decades, the Internet has transformed career building (Hooley, 2012) with the web being a source of information and communication. Indeed, employers (Bartram, 2000) and learning providers (Gomes and Murphy, 2003) quickly recognised the value that

the Internet offered for them to make opportunities available to a wider audience. Furthermore, as Kuhn and Skuterud (2000) assert, individuals that used the Internet to explore resources and opportunities for their skill development and career development are able to gain a competitive advantage over those who do not.

The Web 2.0 revolution in 2004 juxtaposed with the creation of social networking platforms such as MySpace (2003) and Facebook (2004) created different, more communicative and more social ways of using the Internet. The development of social tools such as weblogs, wikis, and social networking sites created new ways of using the Internet to communicate and new ways of communicating. Social media typically enshrined open and many-to-many approaches to communication that allowed the creation of new social and cultural forms. Career networking sites such as Linkedin (2003) provide professionals and organisations with a platform to match skills to job vacancies on an international scale. Indeed, Linkedin (2003) operated the world's largest professional network on the Internet with more than 313 million members in over 200 countries and territories.

Strehlke (2010) argues that it is possible to describe the knowledge, skills and attitudes that are employed to pursue a career and make use of the online environment as 'digital career literacy'. Digital career literacy is concerned with the ability to use the online environment, to search, to make contacts, to get questions answered and to build a positive professional reputation. The author states that digital career literacy is already important to an individual's ability to pursue a career successfully, but it is becoming more important. In contrast, careers workers who are not developing digital career literacy are found to be experiencing no development in their careers at all; illustrating the shift change that the web has brought to

career and skill development. Hooley (2012) identifies a series of ways in which the Internet is shifting the context within which individuals pursue their careers; describing the web as:

- a career resource library, through which individuals can find information that informs and relates to their information needs

- an opportunity marketplace, where individuals can transact with opportunity providers (employers and learning providers)

- a space for the exchange of social capital, within which conversations can be undertaken, contacts identified and networks maintained

- a democratic media channel, through which individuals and groups can communicate their interests and concerns to the wider world, raise their profiles and manage their reputations.

According to Webber and Johnston (2000), the concept of digital career literacy intersects with information and digital literacies as well as with career management skills. Information literacy is a concept, which is used largely within the domain of information science to describe the ability of individuals to find, access and utilise information (Lloyd, 2003).

The Internet is a highly complex social, technological phenomenon, which is increasingly interwoven into every aspect of life, learning and work. Indeed, the web provides rich and diverse opportunities for individual career advancement and employment. As Hooley (2012) notes, the online environment reshapes the context within which individuals pursue their careers and consequently this requires individuals to develop their digital career literacy in order to operate effectively within this context.

2.2.7 Personal/Health/Sexual Advice

The physical, emotional and psychological changes that occur in adolescence often prompts youths to have serious questions about their bodies, relationships and health that are often personal, sensitive or embarrassing (Suzuki and Calzo, 2004).

Dubow, Lovko and Kausch (1990) point out that teens often lack knowledge about available medical resources to answer medical related questions or concerns. The Internet has proved to be a popular platform for health questions due to its accessibility, interactivity, and anonymity. Moreover, it is easy to access, a low-cost means of providing and receiving health information and affords a level of confidentiality that could particularly appeal to teens; which could be especially appealing to those who perceive themselves to have embarrassing or controversial issues.

Previous research (Ackard and Neumark-Sztainer, 2001; Joffe et. al. 1988; Klein and Wilson, 2002) has found that teens find the following issues distressing: interpersonal relationships, weight, depression, suicidal thoughts and confusion about the future and health problems. Older adolescents mentioned issues such as physical fitness, stress, nutrition, STDs, alcohol, good eating behaviours and contraception with their physicians. According to Ackard and Neumark-Sztainer (2001), teens often hesitate to request personal health information from their physicians and there is evidence to suggest that most adolescents do not receive all of the health advice from their health care practitioners that they desire (Boldero and Fallon, 1995; Klein and Wilson, 2002; Malus et. al. 1987).

Confidentially is a particular concern when discussing health issues (Dunham el. al 1998; Ginsburg et. al 1997). Indeed, a wealth of research (Rideout, 2002; Cheng et. al 1993) has found that teenagers and young adults were uncomfortable discussing private health issues, such as sexuality and contraception, whereas younger adolescents were more embarrassed, afraid or uncomfortable discussing certain health issues (e.g. menstruation, pregnancy) than were their older peers.

Given that teen and adolescents concerns about confidentially seems to be a major barrier to seeking information and help directly from others, teenagers may be better served by the anonymity of the Internet, which allows them to explore sensitive topics online that they may not wish to reveal to parents, doctors, school teachers or other acquaintances (McKenna and Bargh, 2000; Rideout, 2002). Indeed, it is commonly acknowledged that health information on the Internet can be found on webpages, bulletin boards, newsgroups, listservs, and chat rooms (Sharp, 2000).

Despite the potential limitations of online health support (e.g. inaccurate information, abusive language and content), many young people find it to be a beneficial resource for obtaining information on health related issues. For example, Fox and Rainie (2002) found that 92% of surveyed participants reported that they found health information online useful. In addition 48% of adult participants said that health information found online improved the way they took care of themselves.

The Internet also provides an arena for peer advice on health issues whilst retaining, to a greater or lesser degree, anonymity. As Fox and Rainie (2000) note, advice is available online

24 hours a day and unlike face-to-face support groups, online support groups also provide access to information for a potentially large number of participants worldwide (White and Dorman, 2001). Other advantages of online support include greater levels of self-disclosure, relative anonymity and the choice of either active or passive participation (i.e. people can view other people's messages without active participation).

As Suzuki and Calzo (2002) note, cyberspace provides a myriad of opportunities for young people to seek advice and support on personal, health related issues whilst maintaining relative anonymity and control on the confidentiality of information.

2.2.8 Specialist groups and fan forums

As more and more societal interaction moves online, so too are fans (e.g. sports) congregating in online discussion forums. Online message boards and discussion forums are popular sites for the expression of support, complaint, disagreement, gossip and connectedness among fans. The most popular boards feature thousands of threads, each devoted to a user-nominated topic, and posts (or messages) numbering in the thousands or millions. Depending on how they run message boards typically require users to register and to consent to their comments being moderated by paid workers and/or volunteers.

Hutchins and Rowe (2013) assert that a distinct hierarchy exists with heavy 'posters' often possessing informally exchanged authority in the user community, both by means of agenda-setting and sheer visibility. Indeed, the most active members build a reputation for their

dedication, ability to convey 'insider knowledge' about the particular topic and their capacity to locate and share hard-to-find snippets of news and information.

Depending on the type of message board in question, threads may contain an array of messages that feature intelligent analysis and in-depth discussion, basic information and items that are met by questions or comments, and debate between fans about a plethora of topics.

As Urbanski (2010) points outs the combination of Internet discussion forums and sports are not new. Fan forums have evolved from asynchronous communication arenas to real time forums. In real-time forums, groups of like-minded fans gather virtually and independently to watch games and talk about it online. Characterised by several key features, real-time forms:

- Occur online;

- Are text based;

- Are contemporaneous with another real time event (e.g. a sporting event)

- Are abstracted from their context.

Thomas (2002) notes that online discussion forums are an increasingly common use of new information and communication technologies in education. It has been suggested that online discussion forums can lead to enhanced learning outcomes for students when used as a tool to promote conversational modes of learning. Indeed, studies suggest that discussion boards are reflective in nature and force students to read others perspectives and carefully consider an appropriate response, thereby encouraging and promoting critical thinking skills. Other

scholars assert that students participate more regularly and in a more thoughtful manner than they would normally do in a face-to-face instructional setting, especially in large-enrollment classes.

Thus, it can be concluded that the online-based forums provide unique spaces for groups of likeminded people to discuss, debate and learn about particular topics.

2.2.9 Shared experiences with distant others

The Internet provides a plethora of opportunities for geographically separated friends and family to maintain long distance relationships. Brubaker et al (2012) found that distributed friends and family used video in tandem with activities such as cooking, watching TV, and even giving birth. Similarly O'Hara et al (2006) found that mobile Video Mediated Communication (VMC) (e.g. Skype) was used for casual communication, show-and-tell, and everyday routines (i.e. entertaining children). Research shows that VMC has multiple benefits when the field of view shifts from talking heads and towards visually sharing an environment. Indeed shared visual environments can improve communication, task performance and help establish common ground (Macaranas et al, 2015). Common ground is defined as the mutual awareness between a group of people understanding the state of a task as well as another member's state, intention, and comprehension in relation to the task. Therefore, by achieving common ground, group members can be more focused on completing the task as opposed to coordinating each other's roles in regard to it.

While much work has explored sharing visual environments for collaborative work, other studies have explored ways in which shared spaces and VMC can create shared experiences

in home and consumer settings. Indeed, previous work has shown as desire for geographically separated family and friends to stay in contact and be part of the day-to-day activities.

Greenberg and Neustaedter (2011) discuss how may couples live a portion of their lives being separated from each other as part of a long-distance relationship. Examples include College students as well as established couples who are geographically separated because of situational demands such as work. Long distance couples sometimes face challenges in maintaining semblance of intimacy given the physical distance between them. Previously, traditional media helped where couples would stay connected by physical letters, telephones, email, texting and instant messaging. However, more recently, couples use VMC to retain a degree of intimacy in long distance relationships. VMC sessions often include couples participating in activities that are sometimes shared and sometimes not, where the key component is simply feeling the presence and involvement of the remote partner in day-to-day life.

The World Wide Web and more specifically free video conferencing software has facilitated more intimate, closer relationships between geographically distant others. Indeed, video chat systems like Skype, Google Chat, Apple FaceTime and iChat are popular platforms, which people adopt as part of their relationship maintenance strategy (Stafford, 2005).

2.3 Risks

Online risks refer to negative experiences facilitated by the Internet. The exact number of and types of risks online at any given time is somewhat of a moving target, however, Hasebrink et al. (2009) identified 13 risks found on the Internet by EU children.

Illegal content	Cyber-bullying, stalking, harassment
Paedophiles, grooming, strangers	Gambling, financial scams
Other harmful or offensive content	Self-harm (suicide, anorexia)
Racist/hate material/activities	Invasions/abuse of privacy
Advertising/commercial persuasion	Illegal activities (hacking, downloading)
Biased/misinformation (advice, health)	Extreme or sexual violence
Exploitation of personal information	

Table 2: Online risks: EU Kids Online (Hasebrink et al. 2009)

The risk set out in Table 2, however, do not exclusively apply to children but equally apply to the adult population. Using the abovementioned categorisations, a thorough exploration of online risks is presented and discussed.

2.3.1 Illegal and Harmful Content

The Internet is a complicated, anarchic and multi-national environment where old concepts of regulation, reliant as they are upon tangibility in time and space, may not be easily applicable or enforceable. There is a plethora of offensive or illegal content online and young people may not deliberately seek out inappropriate content yet still be face with such displays (Cybersmart, 2014). Indeed, children may inadvertently access content while undertaking online searches or they may seek it out or be referred content by others.

Alongside the increased use of the Internet is the fear of children being put at risk and in harm's way through the use of the World Wide Web; this topic has been a central part of the

public and political discourse for many years (Livingstone, 2011; Oswell, 2008). Even though the Internet offers obvious opportunities for acquiring knowledge, engaging in social interaction and creating an identity, a worry remains concerning the dubious aspects of Internet use and content. Pernemalm and Lindgren (2011) highlighted parental reports of worry over their teenagers coming into contact with sexual material when using the Internet, with approximately one third of Swedish parents and more than 70% of U.S. parents (McAfee, 2012) expressed worries about their teenagers coming into contact with pornographic material.

As Sorbring and Lundin (2012) assert, irrespective of the national setting, it is common that young people, advertently or inadvertently come across web pages with, for example, pornographic, violent or hateful content; with almost 60% of all teenagers having either deliberately or by chance accessed illegal or offensive material (Livingstone and Bober, 2005; Swedish Media Council, 2005). Furthermore, about a fifth of the young people who use the Internet state that they have at some point come into contact with material that they have considered to be threatening, degrading, or distressing (Swedish Media Council, 2005).

The issue of young people accessing illegal content online is further exacerbated by mobile technologies. Juxtaposed with the difficulties parents face in attempting to regulate and educate their offspring in appropriate Internet use (Wang, Bianchi and Raley, 2005), teenagers' engagement in the web is becoming an increasingly private activity. More than one third of European teenagers use their mobile devices (mobile phones, tablets, handhelds) to go online (Livingstone, Haddon and Gorzig and Olafsson, 2011). As Sorbing (2012) points out, the rise in mobile technologies have a corresponding impact on more traditional

monitoring strategies of sharing Internet experiences, having a computer in a common room, monitoring browsers and in some instances, the use of monitoring software.

Whether accidental or deliberate, accessing of illegal content can have profound effects on a young persons development. The challenge remains in balancing freedom of expression and regulation of the Internet to protect young people from harm.

2.3.2 Pedophiles, Grooming, Strangers

Child grooming and sexual exploitation is one of parents' worst fears (Staksrud, 2013). Whilst advances in technology have provided individuals with unparalleled opportunities to communicate effectively and in real time, information and communication technologies have also enabled adults with an inappropriate sexual interest in children to establish contact with them, to develop relationships, and to groom potential victims for sexual abuse (Whittle et. al, 2013).

The behaviour and persona of individuals online can differ significantly compared to their direct 'real-life' communication situations (i.e. offline). As Whittle et al (2013) note, such disinhibition may be particularly relevant when considered in the context of online grooming of children and young people. Indeed, Internet crimes against young people regularly dominate the press and cause anxiety among parents, law enforcement, educators, and other child protection experts (Mitchell et. al, 2011).

Mitchell, Finkelhor and Wolak (2005) define the term 'online grooming' as a technique to help turn a sex offender's fantasy into reality, whether online or offline. The term 'grooming' was first included in UK legislation as part of Section 15 of the Sexual Offences Act 2003 (McAlinden, 2006) and this was applied throughout England and Wales in 2004. This action was seen as progressive as it enabled the criminalization of preparatory acts potentially leading to the sexual abuse of children. Craven, Brown and Gilchrist, (2007, p.297) offer the following definition:

"*A process by which a person prepares a child, significant adults and the environment for the abuse of this child. Specific goals include gaining access to the child, gaining the child's compliance and maintaining the child's secrecy to avoid disclosure. This process serves to strengthen the offender's abusive pattern, as it may be used as a means of justifying or denying their actions*."

The above definition may apply to a real world setting, or that which occurs online. Indeed, the behaviour and the purpose of grooming behaviour remain consistent across environments, despite potential variation in specific grooming techniques.

It is commonly acknowledged that grooming is multifaceted and complex. As Gillespie (2004) points out recognising the process of grooming can be difficult and establishing where it begins and ends is almost impossible. Indeed it is widely accepted that child sex offenders are not a homogenous group (McCarthy, 2010; Ospina et al. 2010) and research continues to indicate that online groomers are also heterogeneous. To this end, child grooming often

differs considerably in style, duration and intensity; often reflecting the offender's personality and behaviour.

According to McAlinden (2006) the amount of time invested in grooming an online victim can vary considerably, however, it is generally accepted that it often takes a young person considerable time to feel comfortable talking to a stranger. Webster et al (2012) found that accounts of time frames amongst 33 interviewees varied from seconds, minutes and days to months and even years. A study by Wolak, Finkelhor and Mitchell (2004) found that 64% of offenders communicated for more than one month with their victim. In contrast, however, Briggs et al (2011) found that in a sample of 51 internet-initiated sex offenders, 70% communicated for less than a week, 40% for less than 24 hours before arranging to meet. The study from Briggs et al (2011) noted that their participants were driven by physical contact whereas participants in other studies (Webster et al 2012) were fantasy driven.

The 'grooming' process has a number of commonalities. Cravin et al (2006) highlighted the important commonality between the process an offender uses to prepare a child and the process they use to prepare themselves for carrying out the abuse. Table 3 shows a comparison of models of grooming:

	Finkelhor (1984) Preconditions	Sullivan (2009) Spiral of abuse	Craven et al. (2006) Stages of grooming
Internal	Motivation to sexually abuse	Motivation to sexually abuse	

	Finkelhor (1984) Preconditions	Sullivan (2009) Spiral of abuse	Craven et al. (2006) Stages of grooming
	Overcoming internal inhibitors	Overcoming guilt/fear Fantasy and masturbation	Self grooming
External	Overcoming external inhibitors	Grooming the child and others/victim selection	Grooming the environment and significant others
		Creating opportunity with victim and others	
	Overcoming resistance of the child	Manipulating the perception of victim and others	Grooming of the child
		Preventing discovery and disclosure of victim and others	

Table 3 - Comparison of Models of Grooming

Whittle et al. (2013) investigated the prevalence of online grooming through a systematic review of the literature relating to the sexual exploitation of young people online. Across Europe, 60% of parents stated they are most concerned about their young person becoming a victim of online grooming (European Commission, 2008). Whittle et al. (2013) state that prevalence figures of online grooming are under researched as the focus remains on offline abuse (Bebbington et al. 2011; National Society for the Prevention of Cruelty of Children, 2011). Ospina et al. (2010) review put forward that 2.1% of police cases in the UK each year

relate to online grooming (Gallagher et al. 2006). However Whittle et. al (2013) stated that this statistic is likely to be an underestimation considering that this type of crime has low reporting rates. Online grooming is the most reported suspect activity identified by reports received from members of the UK public with 1536 reports (66% of all reports) received between 1st April 2009 and 31st March 2010 (CEOP, 2012). This indicates the potential prevalence of the crime as well as the public concern surrounding it.

Contact driven offenders are more likely to envisage grooming as a necessary method leading to the opportunity of contact, whereas fantasy driven offenders may be more satisfied by the grooming process itself. Thus, the notion that Internet offenders have different goals is becoming widely accepted (Webster et. al, 2012).

Craven et. al (2006) generated a model of grooming. Within the model the authors identified three types of grooming, namely;

- Grooming the surroundings

- Grooming the self and significant others and;

- Grooming the young person

Craven et. al (2006)'s model generally corresponds with the preconditions model put forward by Finkelhor (2006). Moreover, Craven et al. (2006) highlighted the important commonality between the process an offender uses to prepare a child and the process they use to prepare themselves for carrying out the abuse.

Child grooming is most widely acknowledged in two different forms, namely physical and psychological (Craven et al. 2006). Each victim's experience depends on the offender themselves and the adaption of their strategy for the individual victim. Sullivan's (2006) study, 'Spiral of abuse', identified three primary functions of grooming and found considerable overlap between these functions, as one piece of behaviour may perform dual functions; potentially addressing all three.

Despite variations in grooming techniques, there are commonalities within the process. These include systematically desensitising the child until they are physically and psychologically groomed to the point where there is increased likelihood of their engagement in sexual activity. Moreover, throughout the grooming process, the young person's inhibitions are lowered via active engagement, desensitisation and power control, all of which involve the offender's manipulation of the child (Berson, 2003).

2.3.3 Other Harmful or Offensive Content

The liberation of communication enabled by the Internet also incorporates darker and more problematic dimensions (Yar, 2013). Online content that may be illegal, or deemed offensive and/or harmful is an area of particular concern amongst scholars. Forms of visual and written representations that are often considered offensive include hardcore and violent pornography and domains such as the 'Dark Web' or 'Dark Net'; a private network that facilitates criminal activity. Indeed, the Dark Web or Dark Net provides a peer-to-peer platform in which individuals can exchange files and make purchases in almost guaranteed anonymity. It is commonly acknowledged that the Dark Web is home to many underground criminal activities including illegal drugs, child pornography and weapons trading.

The transnational nature of the Internet presents challenges for law enforcement in the regulation and control of harmful and offensive content online. Indeed, in relation to hate speech and pornography, some forms of representation may be permissible in one country but not in another; regulating access to such content online can prove difficult (as when young children maybe exposed to highly explicitly adult sexual content).

Debates relating to offensive and harmful content are among the most contentious issues relating to the Internet, with some arguing for the prohibition of such content on the grounds of harm whilst others may resist such restriction in the name of freedom of speech (Yar, 2013).

The widespread accessibility of the Internet, along with its affordability, anonymity and convenience is seen by many to increase the likelihood of media harm and offence. Hargrave and Livingstone (2009) assert that arguments regarding adult access to potentially harmful content are the least resolved. Moreover, in the context of young people, there is growing concern of the potential for harm that sites create, primarily by facilitating the easy uploading and accessing of inappropriate content and extending the possibilities for inappropriate contacts.

Hargrave and Livingstone (2009) posit that young people using the Internet are generally aware of the risk of harm and are generally aware of the technical measure and codes of behaviour that they should adopt; thereby suggesting that they often ignore these or, for various reasons, open themselves up to inappropriate or risky experiences. To this end, there

is a growing body of research that suggests offensive content is particularly harmful for vulnerable groups; specifically, people who are sexually compulsive and/or sexual abusers. The authors suggest that the foregoing presents a clear need for further research exploring the ways in which the Internet seems to support or facilitate certain kinds of harmful peer-to-peer activity.

2.3.4. Racist/hate material/activities

Hate speech refers to the various forms of discriminatory material which targets individuals or groups on the grounds of their racial, ethnic, religious, gender, sexual or other characteristics. As Yar (2013) asserts, online hate speech is not a unique phenomenon, rather an extension of utterances (both verbal and written) that occur in the terrestrial world. Indeed, the rapid expansion and embrace of online web based platform has seen an unwelcome proliferation of hate-based speech, materials and activities.

The most commonly observed places of hate speech take the form of websites (and associated chat rooms and bulletin boards) established by organised political groups; typically far right, ultra-nationalist, white supremacist and neo-Nazi in orientation. Such websites typically contain offensive and hateful representations of Blacks, Jews, Muslims and others of non-European origin, women, homosexuals and persons with physical and mental disabilities. The number of such websites is somewhat of a moving target as they often appear, disappear and move location. Moreover, as there is no precise agreed definition of what might compromise 'hateful content' there is room for variation in whether or not a particular site may or may not be included in different studies.

The circulation of online hate speech has moved from marginal spaces associated with extremist groups to more mainstream forums such as new social media like YouTube and Facebook. Citron and Norton (2011) noted the existence of Facebook pages, which promote hate speech against Jews, homosexuals and Musliims. Empirical evidence (Hargrave and Livingstone, 2009) suggests that exposure to such hateful, particularly in the context of vulnerable groups can be persuasive in changing inter-group attitudes, thereby serving to reinforce discrimination and prejudice (Hargrave and Livingstone, 2009).

The Internet offers a number of advantages for 'hate groups'. Indeed, in the case of political movements or organisations, the Web provides extremists with an extremely efficient and cost-effective means of communication, enabling actors with limited financial and material resources to reach a potentially global audience (Shaffer, 2002). Furthermore, as Deirmenjian (2000) asserts, the degree of protection it affords speakers (through anonymous postings, use of pseudonyms) makes it possible to propagate hate speech with a significantly reduced risk of identification and prosecution under anti-hate speech laws. It is widely acknowledged amongst scholars in this field that given the unpalatable nature of extremists' utterances, such groups find it difficult to secure avenues to air their views through conventional, mainstream media. Indeed, the Internet bypasses this dependence, granting such groups access to and control over the means of communication.

Turning to vulnerable individuals online, the Internet enables extremists to tailor their messages to appeal to particular target audiences who might be deemed open to influence. Indeed, according to Woolf (2004) extremist groups and hate preachers have found the

Internet to be the most effective medium in disseminating and instilling their ideologies to vulnerable individuals.

In summary, the issue of hate groups is exacerbated with the affordances of anonymity and the difficulty in censoring such material. Indeed, one of the greatest obstacles to the effective regulation and punishment of hate speech online arises from the variation in hate crime laws across national territories worldwide (Yar, 2013).

2.3.5. Exploitation of Personal Information, Abuse of Privacy and Cyberbullying

Online interactive environments have moved from a niche phenomenon to mass adoption over recent years since the advent of the Internet. Indeed, the rapid increase in participation in very recent years has been accompanied by a progressive diversification and sophistication of purposes and usage patterns across a multitude of different sites. With the rapidly increasing participation rates in online interactive environments comes an increased level of personal and sensitive data disclosure.

The definition of privacy has evolved from the original concept of a physical notion to one that is focused on the control and flow of personal information about the self (Atkinson, 2007). Indeed, scholarly discussion on privacy has long since focused on the control of personal data between entities. Moreover, legislation has been enacted (e.g. Data Protection Act 1998) to provide a greater level of protection for the individual data subject and provides for a greater level of legal redress for organisations that misuse personal and sensitive data.

Despite the plethora of awareness raising campaigns and enhanced privacy controls, a substantial proportion of end users voluntarily divulge personal and sensitive information in online interactive domains including social networking sites and online games to name but two. Social networking websites are platforms in which users can compile personal and somewhat intimate profiles of themselves and interact with others. As Gross and Acquisti (2005) assert, such apparent openness to reveal personal information to vast networks of loosely defined acquaintances and complete strangers provides significant cause for concern. Indeed the voluntary disclosure of personal and sensitive data presents corresponding risks such as identify theft, fraud, cyberbullying and other forms of abuse such as grooming.

The rapid embrace of new and evolving technologies paves the way for new forms of self-expression. One such form consists of sexting; a new technological communication trend of individuals distributing nude, semi-nude or sexually suggestive text messages through electronic messaging (i.e. mobile phones). In the case of young people, sexuality is a core topic among teens therefore; in an era of technological advancements teens who desire sexual exploration may do so through the convenience of electronic handheld devices (Lenhart et al, 2010). However, any number of risks and problems can arise from such practices including an increased risk of cyberbullying, damage to reputation or criminal charges that require teens and young adults to register as sex offenders (Manzo, 2009).

In addition to the criminal charges associated with the possession of explicit child pornographic material is the negative consequences of the potentially uncontrollable distribution of images among peers and social networks. As Kotch (2009) points out,

consequences such as suicide and extreme embarrassment are two common documented outcomes of sexting.

Personal and sensitive data is both valuable to individuals and organisations. It is commonly acknowledged that organisations amass and store mass amounts of personal and sensitive data (Tene and Polonetsky, 2013). "Big Data" is the term coined to describe the collection of large data sets that was once difficult to process. Advances in data mining and analytics and the massive increase in computing power and data storage capacity have expanded, by orders of magnitude, the scope of information available to businesses, government and individuals. Furthermore, the increasing number of people, devices and sensors that are now connected by digital networks has revolutionised the ability to generate, communicate, share and access data (Tene and Polonetsky, 2013).

The harvesting of large data sets and the use of analytics clearly implicate privacy concerns. The tasks of ensuring data security and protecting privacy become harder as information is multiplied and shared more widely around the world. Indeed, information regarding individuals' health, location, electricity use and online activity is exposed to scrutiny, raising concerns about profiling, discrimination, exclusion, and loss of control. Traditionally, organisations used various methods of de-identification (e.g. pseudonymisation, anonymisation, encryption, key-coding and data sharding) to distance data from real identities and thus containing privacy concerns. However, Ohm (2010) and other scholars assert that anonymised data can be re-identified and attributed to specific individuals; thus creating a corresponding need to treat all data as personally identifiable and subject to the relevant protective legislation.

As Mayer-Schonberger (2011) asserts, the digital age embodies the phenomenon of perfect remembering, illustrating the potential consequences of remembering what is sometimes better forgotten. Indeed, digital technology and global networks override humans ability to naturally forget with the past being ever present, ready to be called upon at the click of a mouse button.

2.3.6. Gambling, Financial Scams

In the last decade, online gambling has grown from a minor window show on the Internet into a substantial global industry. According to worldwide market estimates, in 2012, online gambling reached 9.5% (approximately €27bn) of the total worldwide gaming revenues (equating to approximately to €283bn in 2012). Moreover, online gambling services employ an increasing number of people from highly technical backgrounds, which in turn generates sizable amounts of tax revenues (Cadagnone et al. 2014).

The Internet has made online gambling easier and more accessible to a wide range of audiences including children and adolescents. Indeed, a myriad of sites have emerged in recent years offering countless gambling opportunities, including, online lotteries, bingo and traditional card games such as blackjack and poker. Moreover, users can engage in online gambling activities using a variety of means including PC's, television, games consoles and mobile devices.

In contrast to online gaming, where the fun of the experience is the main draw, gambling involves money and or possessions. Indeed, addiction to gambling is a recognised psychological condition, with treatment programmes available in many countries.

Gambling in the context of minors remains an ongoing issue, however the extent to which minors participate in illegal online gambling remains unclear. Furthermore, as different countries have different legislative approaches to gambling presents challenges in regulating young people's access to such services (SaferInternet, 2015). Although gambling is universally prohibited for minors, some countries have more open approach towards wider population gambling, potentially providing easier access for youngsters in some countries than in others.

One of the key issues relating to online gambling is that of financial risk and potentially significant loss. It is commonly acknowledged that addiction to gambling results in serious financial losses. In the context of young people, in theory it should be more difficult to incur financial loss. However, there has been instances reported (BBC, 2011) of minors using parent's credit cards online and accumulating sizable debts.

Griffiths (2015) argues that there is a significant overlap between gambling and seemingly innocuous online games, with many games allowing users to customise their avatar by spending money on virtual accessories or extra clothing. Griffiths (2011) study of 2,700 British secondary students found that 15% has played free gambling games during the week prior to the survey. This highlights the overlap between gambling and social gaming, both of which offer intermittent, unpredictable rewards for users and the desire for sure rewards is the pre-cursor to addiction.

2.3.7. Self Harm

Self harm is often understood to be a physical response to an emotional pain of some kind and, research has found that this type of behaviour can be very addictive. Over half of 11-14 year olds have self harmed themselves or know someone who has (NSPCC, 2015).

The increase in awareness of self harm generally has seen a corresponding rise in the number of websites covering the issue in both a positive and negative fashion. Cyberbullying and other forms of online abuse can drive young people to self harm, whilst pro-self-harm websites or communities that spread knowledge of self harming techniques can encourage experimentation.

An emerging form of self harm is that of cyber self harm (Boyd, 2015). Otherwise known as self-cyberbullying or self-trolling, the act involves abusive messages and insults being directed by the sender at themselves, often through anonymous platforms. The Massachusetts Aggression Reduction Centre (Englander, 2015) found that 15% of 18 year olds surveyed in both 2012 and 2013 had falsely posted a cruel remark against themselves, or cyberbullied themselves, during high school. Moreover, among children who do admit to bullying others, the rate was as high as 32%.

2.3.8. Illegal Activities

Illegal activities online are acts that are undertaken in breach of local, national or international laws such as the illegal downloading of pirated movies, games and other content (Bouhnik and Deshen, 2013). In addition to the risk of legal redress, engaging in illegal activities often

exposes users to potentially harmful content such as pornography, financial scams, and viruses. Exposure to such content can often bring further harm such as the invasion of privacy and disclosure of sensitive information.

2.3.9. Extreme or Sexual Violence

According to Livingstone et al (2013), children's accounts of online risk revealed concerns over graphic and extreme content. The most recent form of extreme content is the distribution of terrorist material online depicting extreme violence and killing (BBC, 2015).

Protecting young people and vulnerable individuals from extreme and sexual violence requires a multifaceted approach. Whilst some argue the need for awareness raising methods and parental guidance (NSPCC, 2015; Livingstone et al, 2013), others advocate technical countermeasures such as content filtering and censorship.

Content filtering and censorship at a network-level by Internet Service Providers (ISPs) and family based filters are regarded as two very different methods, with the former being a nationwide filter that potentially violates freedom of speech and the latter being a mechanism that families can voluntarily choose to implement on an individual basis. Furthermore, consideration should be given to the means in which extreme or sexually violent websites should be classified and filtered. For example, at the time of writing, a small number of websites focus on attracting UK nationals and radicalising them, whilst other sites host content that could be deemed extremist, such as social media sites, message boards or user generated video platforms (e.g. YouTube).

2.4 Contextual Influences

Establishing context defines the scope of the risk (Bryman, 2012). Therefore, to accurately assess the opportunities and risks encountered, consideration must be given to the contextual influences. In the case of children's interaction online, Hasebrink et al (2009) framed their study into children's opportunities and risks using the following strategic framework (Figure 1). On an individual level, age, gender and socioeconomic status (SES) were defined as three factors that could influence young people's interaction with online opportunities and risks in a mutually reinforcing way. Moreover, these variables are mediated by parents, teachers and peers. Hasebrink et al (2009) study was divided into an individual (child centred) level of analysis and a country (macro societal) level of analysis.
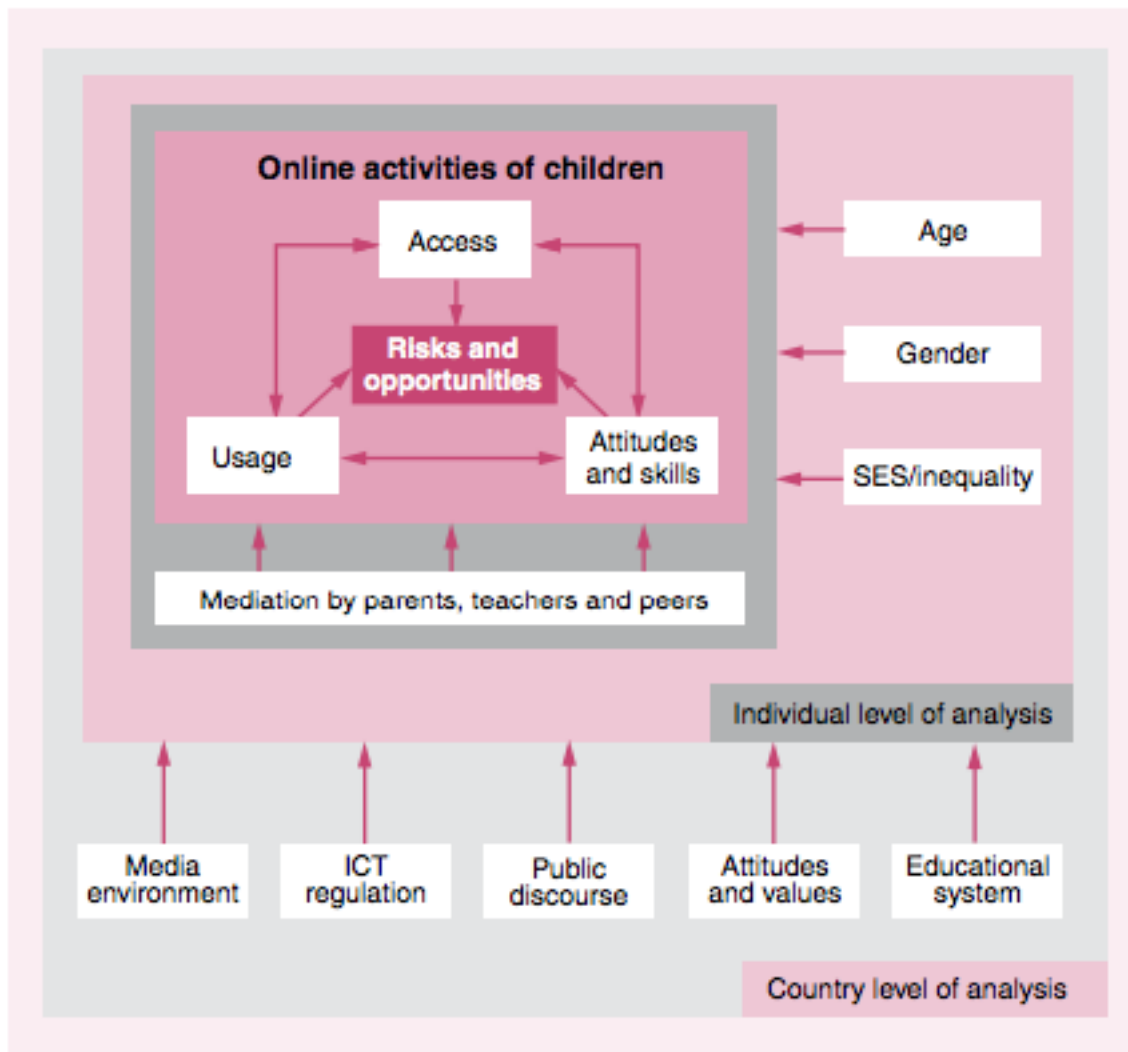
Figure 1 - EU Kids Online - Analytic Framework (Hasebrink et al, 2009)

Furthermore, their study sought to compare opportunities and risks cross-nationally and identified the following country level contextual influences:

- Media environment

- ICT regulation

- Public discourse

- Attitudes and values and;

- Educational system

The opportunities and risks in online interactive environments are influenced by a number of contextual influences and an individual's propensity to experience these is based upon the juxtaposition of the foregoing. The analytic framework put forward by Hasebrink et al (2008) (figure 1) is further examined in Chapter 6.

This chapter has explored a wide range of opportunities and risks in online interactive environments and consideration has been given to an array of contextual influences. Chapter 3 explores Massively Multiplayer Online Role Playing Game (MMORPG's) environments and provides both the background and justification for the research presented in the succeeding chapters.

Chapter 3: Understanding Massively Multiplayer Online Role Playing Games (MMORPGs)

"Massively Multiplayer Online Role-Playing Games such as World of Warcraft have become the de facto home to a lost generation of teens" (Winder, 2008, p.15)

This chapter explores the complexities and characteristics of Massively Multiplayer Online Role Playing Games (MMORPGs). Online communities and social interaction within the MMORPG arena is discussed and the chapter continues with an examination of the most popular MMORPG at the time of writing, World of Warcraft, which the contributions of this thesis are based upon. The chapter concludes with a review of opportunities and risks followed by a number of research questions.

3.1 Background

Over the previous two decades, Internet access in the home has become increasingly common, leading to an upsurge in the popularity of small, often privately designed and hosted, online text-based games that were accessible through a dial-up modem connection. These games were known as Multi-User-Dungeons (MUDs) and represented the very first online multiplayer games. MUDs have since evolved into Massively Multiplayer Online Role Playing Games that constitute a rapidly growing multimillion dollar industry attracting more players than any other type of game.

Traditional MUDs consisted of a fantasy world where players could choose to play different characters with specific skill sets and powers. Multi-User-Dungeons differ from other game genres due to their persistent worlds; when a player stops playing, the gaming world

continues to evolve and exist. The theme of MUDs is typically to slay monsters, explore the world, complete quests, participate in a role-playing story and progress a created character, otherwise known as an avatar. MUDs have also been used for distance based learning, virtual meetings, teleconferencing, as well as for the sole purpose of socialising. The MUD environment is entirely text-based with character actions and movements directed by text-based commands and descriptions. Gamers typically interact with each other and the world through the typing of commands that resemble a natural language (Winther, 2010).

During the early 1990s, as the graphical and processing capabilities of the personal computer increased together with growing accessibility to the Internet, the Multi-User Dungeon genre steadily evolved into what is, today, known as the Massively Multiplayer Online Role Playing Game genre; the most significant differences between MUDs and MMORPGs being the addition of a graphical user interface and the number of simultaneous gamers the MMORPG world can support at once. According to Yee (2006), Ultima Online, launched in 1997, was recognised as the first MMORPG that allowed thousands of users to be logged on at the same time in a persistent, graphical, online environment. The second MMORPG, EverQuest, was launched in 1999 and quickly achieved a player base of 400,000, illustrating the widespread popularity and rapid uptake.

MMORPGs are fully developed multiplayer universes with an advanced and detailed visual and auditory world in which players create an idealistic character with specific skills and powers (Griffiths et. al. 2004). Analogous to MUDs, each player creates and controls their own avatar character and its actions. Users purchase or download the specific MMORPG client and typically pay a regular monthly subscription (approximately 10-15 US Dollars) to gain access to central servers. Players view the game world in real-time 3D graphics and

manoeuvre their avatar using a combination of mouse driven user interface and keyboard commands. The player's avatar is used to interact with both the environment and other gamers and communication is facilitated through microphone and headsets over voice channels, typed text-based chat and animated command-driven gestures and expressions. MMORPGs are vast, complex and graphically rich environments that typically require many hours to traverse the entire world; although various types of transportation are often available to facilitate faster travel between locations. Players are able to fully customise their avatar, including their character's race (e.g. Worgen, Human and Orc in World of Warcraft), gender, skin tone, age, height, weight, musculature, cheek prominence, jaw prominence, brow prominence, eye colour, hair style, hair colour, mouth shape and clothing.

Players can choose from a set of professions or roles based on the type, race and class of avatar. The permanence and flexibility of roles depend on the design of the gaming environment. Different roles have varying strengths and weaknesses with most MMORPGs designed such that players must collaborate to achieve goals and rewards. According to Yee (2006), more recent MMORPGs have a plethora of different roles with diverse professions (e.g. skilled musician, politician) which have evolved from early MMORPGs based on fantasy medieval worlds popularised by traditional Role Playing Games and contained only combat orientated roles (e.g. warrior, healer). The varying roles and diverse professions add to the increase in number of subscribers with differing motivations for play (Taylor and Taylor, 2009; Yee, 2006).

Advancement in many MMORPG worlds is measured by skill and experience levels which are developed by completing missions or quests to earn rewards. The designs of many MMORPG

infrastructures encompass Skinner's (1976) theory of operant conditioning using a random interval reinforcement schedule. Therefore, early goals, rewards and achievements are almost instantaneous with players advancing through levels quickly; however, as the players' level and experience increases, the amount of time between rewards also increases until progression becomes almost imperceptible. In addition, due to varying strengths and weaknesses in different races and classes of avatars, progression in the game often requires users to collaborate to achieve common goals. Collaboration is often mutually beneficial with all players receiving some form of reward (e.g. increased experience, skill level, weapons).

The complex, rich, and immersive environment accommodates a wide range of subscribers with very different motivations, removing the necessity for complicated lengthy storylines and goals. Consequently, each player decides which form of advancement they wish to follow, adventures, stories; and most interestingly new interactions and relationships between players emerge. The design of many MMORPG environments facilitate (and in many cases force) the building of complex social networks, including guilds (user created membership group or organisation which is typically long term), raid (combat) groups (temporary short term collaboration of a relatively small number of users) and alliances (agreements between guilds or races) (Yee, 2006).

3.2 MMORPGs as Online Communities

Massively Multiplayer Online Role Playing Games are commonly perceived as a novel form of online social interaction; however, their characteristics could be better understood in the context of online communities, of which MMORPGs are a more recent type. Online communities are broadly defined as groups of people "who come together for a particular

76

purpose, and who are you guided by policies (including norms and rules) and supported by software" (De Souza and Preece, 2004; Preece and Maloney-Krichmar, 2005).

Various technologies have been used to create different online communities, including early Usenet and web based forums as well as more recent social networking technology, blogging and wikis. Online communities are playing an increasingly important role in various aspects of human life, including information sharing (e.g. hotel reviews), collaborative production (e.g. open source software development), and social support (e.g. online health support groups). Such communities comprise a considerable portion of Internet use and research has argued that social interaction is a primary driving force for gamers to continue to play MMORPGs (Chen and Duh, 2007). Griffiths et al (2003) reported that 41% of gamers found the social interaction to be their favourite part of the game.

It is commonly acknowledged that, historically, computer gaming has been dominated by adolescent males (Krotoski, 2004), however, MMORPGs such as World of Warcraft and EverQuest have continued to attract greater numbers of female subscribers, many of whom are over the age of 30. Indeed, the Entertainment and Software Association (2012) reported that in 2011, the average game player was 30 years old and been playing games for 12 years. In addition, the ESA found that 47% of all game players were women. Taylor (2003) asserts that the growing population of female participants is encouraged by themes of social interaction and exploration that are common place in MMORPGs.

Yee's (2001; 2006; 2007; 2008) research over the previous decade found that MMORPGs allow new forms of social identity and social interactions with friendships and romances being common place in these immersive arenas. Yee's (2006) survey research into EverQuest

gamers found that 3% of male and 15% of female players are in real-life romantic relationships (i.e. engaged, dating or married) with someone they first met in the world known as Norrath.

Yee (2008) argues that social interaction in online communities is shaped by the structural characteristics and rules of the MMORPG architecture. The rules of interaction are strictly defined, thereby encouraging certain behaviours, whilst making other behaviours more difficult to carry out. For example, in World of Warcraft, players have access to several different chat channels including, guild channel (messages can only be seen by members of the same guild), raid channel (messages can only be seen by members of the same raid group) and private channels (private messages sent to one specific player). Nardi and Harris (2006) note the social organisation of the game and player culture affect players enjoyment and learning of the game. They assert that play is characterised by a multiplicity of collaborations from brief information encounters to highly organised play in structured groups which in turn, makes the game more enjoyable and provides for rich learning opportunities.

Inter-player dependence and the corresponding necessity of grouping both encourages and shapes social interaction. This structural design is common in many MMORPGs with classes of characters largely designed to be complementary and synergistic. Characters, depending on their class, have a weakness that another class can resolve, creating a corresponding need for social interaction. Although the design trend in more recent MMORPGs enables characters to make progress on their own (often referred to as solo-ability), complex missions (otherwise known as raids) require many different characters with various abilities and skills. Therefore, Yee (2009) asserts that the structural characteristics and social architecture of MMORPG worlds play a crucial role in the development and maintenance of social

interactions, friendships and relationships. To this end, decreasing solo-ability increases the likelihood that players interact and form relationships with each other.

In MMORPG online communities, dependence on other players encourages relationship formation in two ways. Firstly, it increases the number of possible interactions that can occur among players and; secondly it increases the number of ways that players can help and offer assistance to each other.   Acts of altruism forge strong social connections between gamers and previous research (Yee, 2006; Chen and Duh, 2007) found that players did not regard economic transactions (e.g. selling equipment or weapons to another player) as altruistic due to a lack of emotional salience.

MMORPG environments encourage players to become altruistic in a way that may not be immediately obvious (Yee, 2009; Cole and Griffiths, 2007; Nardi and Harris, 2006). To this end, research findings suggest that these immersive environments provide a platform for players to engage in new social communities, with different rules and regulations and identities. Online role playing games removes much of the ambiguity and danger of altruism in real life and provides players with powerful ways of help one another.

3.3 Trust, Commitment and Crises in a Dangerous World

Trust, commitment and altruism all play important roles in MMORPGs as the gaming environment frequently places players in emergency and crises situations. As gamers face

monsters and enemies that are too powerful and damaging to combat individually, the level of trust, commitment and team work will determine the teams' survival. Once engaged in combat scenarios, players have little time to discuss strategy, particularly over typed text-based chat. Players are expected to remain committed to the team in such crises situations and abandonment during combat can have severe consequences to a players' social reputation. Indeed, each player has a different role, loyalty and 'purpose' to the leader and group, as well as their own strengths and weaknesses; as such the likelihood of survival during such a crises situation differs between different types of characters (Yee, 2009; Nardi and Harris, 2006).

It is commonly acknowledged in MMORPG gaming communities and beyond that players demonstrate high levels of emotional investment in both their character and the outcomes of combat-orientated play. Previous studies (Hussain and Griffiths, 2009) show that players not only exhibit high degrees of emotional investment in the game and their character but also high degrees of trust in fellow gamers. To this end, due to the frequent, complex and varying crises that often occur in MMORPGs players must work together as a team building trust with both friends and strangers. Chen et al (2008) found that game feature change in World of Warcraft changed the dynamics of social interaction in the popular MMORPG World of Warcraft; for example capping the size of groups (i.e. lowered raid cap) appeared to favour depth over breadth in online relationships. Compulsory groupings encouraged a player to become more acquainted with their team mates and smaller group sizes favoured a more compact community size. As group sizes were reduced, displaced members would form groups of their own creating a larger number of small and closely knit groups.

The increasing and complex level of difficulty and heroic instances encourage deepened interpersonal relationships. Juxtaposed with the unpredictability of MMORPG features and dynamic game difficulties, the only constant that a player can depend on are their collaborative team members. According to Chen et al (2008), increased inter-player dependence and deepened interpersonal relationships embodied qualities of faithfulness and commitment to fellow players and friends, producing positive interactional experiences and personal satisfaction. In contrast, players who do not adhere to their social roles within the game and lack commitment receive negative feedback from fellow team members.

Adding to the complexities generated by the social architecture of the MMORPG is the potential for misunderstandings between players within these online communities. For example, critiquing others playing abilities can lead to conflict within the group and fragmentation of the close knit community. Consequently, analogous to real life social interaction, players have reported to be tactful and considerate in their approach whilst paying close attention to avatar body language (Chen et al 2008; Yee, 2009).

Another dimension which reinforces and strengthens the level of trust and commitment between players is that of virtual 'death'. Whilst in many MMORPG worlds, characters are essentially immortal; an avatar death can have expensive consequences. Death is the state a character reaches when their health level reaches zero or less. Once a character dies, it loses a percentage of experience level and in many cases some or all of their equipment and possessions. As the penalty for death is a fixed percentage, low level players could lose some amounts of time, whereas high level players could loose many hours of their past efforts. Upon death, the characters equipment and possessions remain with its corpse for a limited time period (i.e. the 'decay' period of the corpse) at the position where the player was killed.

The ghost or spirit of the character must return to the corpse before the end of the decay period in order to recover their remaining equipment and possessions. As death is more frequent in more difficult and dangerous locations, corpses are usually difficult to retrieve without being killed again; thus the likelihood of death reinforces the need to trust and remain committed to a particular group or guild. Keeping in mind that death could mean an instantaneous loss of past effort and potential loss of equipment and possessions that a player has spent many hours working towards, the emotional investment and corresponding need for inter-player support, altruism and trust is critical to survival in the gaming arena (Coulson et al. 2012; Yee, 2009; Chen et al 2007). Therefore, Yee (2008) asserts that the risk of death increases both social interactions and inter-player trust.

The structural characteristics of MMORPGs provide a platform for social engineering which millions of players interact and collaborate in on a daily basis. Moreover, the social architecture of these worlds are pervasive in ways that may not always be apparent to inhabitants but they tacitly shape how players interact with each other and the relationships that form between them, as well as the ways in which they trust, relate and help each other (Yee, 2009).

3.4 Motivations of Play

Establishing why MMORPG gamers play has revealed (Yee, 2006; Yee, 2012; Bartle, 2004) a wide range of motivations. Indeed, these immersive worlds are able to attract millions of people of various ages, nationalities and backgrounds to voluntarily participate in a world outside of a laboratory setting, providing an unprecedented opportunity to ascertain their motivations for play. There has been a substantial body of empirical research undertaken on player types and motivations (Drachen et. al, 2009; Jackson et. al. 2009; Kallio et. al. 2010; Klug and Schell, 2006) however, the two most notable motivation models are that of Bartle (1996; 2004) and Yee (2006).

Bartle (1996) developed a well-known model of player motivations which provided an important insight into how players may differ from one another in Multi-User Dungeons. Player motivations were originally categorised into 4 Player Types consisting of: Socialiser, Achiever, Killer and Explorer, which were based on two underlying axes. An 8 Player Type model for virtual world players was subsequently developed (Bartle, 2004) which consisted of: opportunist, planner, scientist, hacker, networker, friend, politician, and griefer.

Subsequent research (Dixon, 2011; Yee, 2006) identified several limitations with Bartle's (2004) Player Types. Firstly, the Player Types model is based on particular genre of game – MUDs, therefore, it is difficult to generalise outside the context that the research was carried out in. Secondly, there is a methodological problem in interpreting in-game behaviours as specific motivation or play preferences without actually engaging in qualitative research with gamers (Dixon, 2011). Furthermore, players have different strategies for play and that as well as large-scale groupings of behaviour around preferred playing, there are also many hidden,

appropriative or resistive types of game play that need to be considered (Nakamura and Wirman, 2005). Although Bartle's Player Types serves as an insightful model for MUDs, the model cannot accurately be applied out of context to other game genres (i.e. MMORPGs). Indeed, Bartle claims that the player types are mutually exclusive, however Dixon (2011) and Yee (2006) point out that the components of each player type may not be correlated or maybe overlapping or mixed. Moreover, the model is not based on empirical evidence that can be validated.

Yee (2007; 2012) proposed a motivation taxonomy based on an iterative factor analytic examination and restructuring of Bartle's player taxonomy of MUD players. Yee's research identified 10 motivations that fall into 3 higher level categories related to: achievement, social and immersion motivations. Table 2 presents Yee's Taxonomy of Player Motivations:

Achievement	Social	Immersion
Advancement Progress, Power, Accumulation, Status	**Socializing** Casual Chat, Helping Others, Making Friends	**Discovery** Exploration, Lore, Finding Hidden Things
Mechanics Numbers, Optimization, Templating, Analysis	**Relationship** Personal, Self-Disclosure, Find and Give Support	**Role-Playing** Story Line, Character History, Roles, Fantasy
Competition Challenging Others, Provocation, Domination	**Teamwork** Collaboration, Groups, Group Achievements	**Customization** Appearances, Accessories, Style, Color Schemes
		Escapism Relax, Escape from RL, Avoid RL Problems

Figure 2 - Taxonomy of Player Motivations (Yee, 2007)

The subcomponents of Yee's model are described below with an emphasis on the scoring of subcomponents. Yee (2007) notes that scoring low on a particular subcomponent is equally revealing as scoring high on others.

Achievement

Advancement: Players who attain a high score in the advancement subcomponent gain satisfaction from reaching goals, levelling their character and accumulating in-game rewards and resources (e.g. gold). They are focused on making constant progress, gaining power such as combat prowess, social recognition and superiority. Players who score high in this subcomponent are typically attracted to serious high achieving guilds that aid and assist their advancement.

Mechanics: Players who attain a high score in the mechanics subcomponent gain satisfaction from analysing and understanding the underlying mechanics of the game system. Examples include calculating damage caused by different weapons. Typically, their aim in understanding the underlying system is to optimise their character to excel in a particular domain.

Competition: Players who attain a high score in the competition subcomponent gain satisfaction from the experience of competing with other gamers in combat or economy. This subcomponent includes both fair, constrained challenges (e.g. structured Player vs Player combat) and unprovoked attacks (e.g. scamming and griefing). Additionally, gamers also enjoy the power of beating or dominating others players.

Social

Socialising: Players who attain a high score in the socialising subcomponent gain satisfaction from meeting and interacting with others in the game. They enjoy chatting and socialising with other players as well as offering support and assistance to fellow players (experienced or novice). Players are typically drawn to more casual friendly guilds.

Relationship: Players who attain a high score in the relationship subcomponent gain satisfaction from sustained, meaningful relationships with others. They enjoy personal and meaningful conversations, sometimes discussing real life issues or problems. Players motivated by relationships typically seek out close online friends when in need of support and provide support to others when faced with issues or problems.

Teamwork: Players who attain a high score in the teamwork subcomponent gain satisfaction from working together and collaborating with other gamers. They prefer to group than play solo and typically derive more satisfaction from group achievements than from individual achievements. In contrast, players who attain a low score in this subcomponent prefer solo play and to be self-sufficient. They typically group only when absolutely necessary and generally do not want to rely on assistance from other gamers.

Immersion

Discovery: Players who attain a high score in the discovery subcomponent gain satisfaction from exploring the gaming world, discovering new locations, quests and artefacts that others may not know about. They enjoy travelling the world and investigating physical locations such as caves and dungeons. Additionally, they enjoy collecting artefacts or trinkets that few others own.

Role-Playing: Players who attain a high score in the role-playing subcomponent gain satisfaction from being immersed in a storyline. They typically take time to thoroughly understand the underpinning story of the world as well as spending time creating a history and story for their character. Additionally, they enjoy role-playing their character into the larger persistent story of the world.

Customisation: Players who attain a high score in the customisation subcomponent gain satisfaction from customising the appearance of their character. The unique style and appearance of their character is of upmost importance. They prefer games that offer a plethora of customisation options and take time to ensure their character has a matching colour scheme and style.

Escapism: Players who attain a high score in the escapism subcomponent gain satisfaction from using the gaming arena as a place to relax or relieve from real world stresses. These players typically use the game as a means to avoid thinking about real life problems or as a general means to escape real life as a whole.

Understanding why players initially engage with and continue to participate in Massively Multiplayer Online Role Playing Game worlds provides the foundation in which to explore the more complex phenomena that emerge from these environments.   Yee's (2006) taxonomy of player motivations is embraced in the contributions to knowledge presented in this thesis as the components and subcomponents of the taxonomy are based on empirical evidence from the MMORPG genre and, as such is contextually valid and therefore the most relevant motivation model for this research. The model is supported by a quantitative questionnaire

scale which has been tested for validity and reliability. Furthermore, at the time of writing, Yee's (2006) motivation taxonomy was the most widely cited model in academic literature.

3.5 Structural Characteristics of World of Warcraft

Thus far, chapter 3 has explored the evolution of MMORPGs, the general dynamics of social interaction in online games together with the high levels of inter-player trust and commitment which shapes these social interactions. In addition, the motivations of online gamers were discussed, highlighting why such a diverse range of people voluntarily immerse themselves in these environments for long periods of time.   MMORPG worlds are heterogeneous; as such the unique structural characteristics can have very different effects on player interaction and behaviour. The game feature change directly changes the dynamics of interaction and the formation of relationships (Chen et. al, 2008).

World of Warcraft (WoW) is the most popular Massively Multiplayer Online Role Playing with a worldwide subscription rate of over 9 million at the time of writing (BBC News, 2012). Due to its overwhelming popularity in comparison to other games in the MMORPG genre, WoW was chosen as the platform on which a number of the novel contributions of this thesis are based. It is therefore important to critically examine the structural characteristics of this specific environment together with the corresponding implications on game play and social dynamics.

Appendix A provides a detailed overview of the content and mechanics of WoW. Part B of Appendix A describes the character creation and customisation options available within WoW. Part C of Appendix A discusses the role and usage of *Guilds* in WoW.

3.5.1 Social interaction

It is commonly acknowledged that MMORPGs environments and in particular World of Warcraft are very social in nature, attracting millions of players to engage in a real time shared virtual arena. Combat, questing, missions and character development are not a new phenomenon with a plethora of single player games embracing the aforementioned features. One of the main aspects of attraction and retention of subscribers is that of the limitless opportunities for social interaction (Coulson et al. 2012; Yee, 2009; Chen et al 2007; Yee, 2012).

World of Warcraft facilitates social interaction through three types of activities; player to player trading, chatting (i.e. text or voice) and collaborative play. Firstly, WoW players can acquire and produce in-game items which can be traded for other items or in-game currency. Secondly, players' main form of interaction is through text-based chat which forms part of the game interface, although a proportion of players use third party voice chat software (e.g. Ventrillo) facilitating communication through a headset. Many chat channels are available to gamers with varying degrees of privacy, including direct messages to a specific, single player (otherwise known as a "tell" or "whisper"), to a group or guild which to which the player currently belongs (otherwise known as "guild channel" or "raid channel"), to players in the same zone or region (e.g. "Say" – seen by everyone in 25 yard radius or "Yell" – seen by everyone in 300 yard radius). The third type of interaction activity is collective play in raids or guilds and two mechanisms are used to encourage collaboration in World of Warcraft. Firstly, as previously discussed, character classes have different abilities, skill sets, strengths and weaknesses which encourage collaboration and co-operation between players. The recruitment of players from diverse classes is an important task in ensuring the formation of

a well balanced combat group. Secondly, for the majority of high-level quests and raids, the only means of succeeding in combat is through effective grouping and strategies. In the case of less challenging quests and combat encounters which can successfully accomplished by solo players, collaboration and co-operation between players could significantly expedite the combat process, reduce repetition and lower individual character damage.

When players form into a group, it is important that each member is of similar level. If the levels between characters differ significantly, then lower level members need to be mentored by higher level players, otherwise they receive most of the experience gain leaving lower level players with very little reward. In this case, the more experienced character will earn a discounted number of points from play.

Collaborative play takes many forms in World of Warcraft offering functionalities which enable gamers to form groups and raids of varying number of players.   The smallest configuration is a pair of players which are usually of complementary classes (i.e. with strengths and weaknesses that support each other). Two types of groups exist in World of Warcraft namely party and raid.

A party is a collection of player characters that can communicate amongst one another privately, share experience points and manage the distribution of loot from any mob (generic term for any non-player entity whose primary purpose is to be killed for experience, quest objective or loot) party members killed. A party is limited to 5 characters of which only 1 can be a leader. The leader can invite new members, remove current members or promote another member to the position of leader. The leader cannot, however, force a player to

remain in the party if they wish to leave voluntarily. Group leaders also control the loot level and loot quality threshold which defines how loot is distributed. In the case of a leader leaves the group another player is chosen at random.

Raid groups range between 6 and 40 people, which are subdivided into (up to) 8 groups of (up to 5) players. Raiding primarily and traditionally refers to player versus environment raid specific instances and zones. Party leaders can convert their group into a raid group and new players would then join the raid group (up to a maximum of 40). Members of raid groups do not receive credit for completing quest objectives unless a raid specifically forms part of the quest. Players receive an experience reduction for any mob killed in a raid group to prevent gamers from creating very large groups in order to complete normal quests or other in-game tasks intended for parties of 5 members of less.

World of Warcraft provides players with tools which allow them to join groups. For example, the Pick Up Group (PUG) tool groups random players together using a matchmaking system for the purposes of undertaking an instance or quest. Typically, PUGs are less organised than groups formed from people of the same guild or faction as PUG players are less familiar with each other.

As previously discussed, group formation and team member recruitment is particularly important. The guild or group must be well balanced with sufficient classes of players with the required skills and abilities. Additional players are often invited to join guilds and groups if they possess the necessary skills required by the team.

Once a group is formed and the appropriate level players have been recruited, members prepare for combat which usually include devising strategies and negotiating rules and expectations. The group or guild continues to travel to a safe place adjacent to the target combat zone to regroup and prepare for the impending battle. Ultimately, if too many members or key players (i.e. the 'healer') die then the battle will be unsuccessful. If, however, the group or guild is successful then valuable items (loot) will be dropped from the enemy target and distributed amongst the members in accordance with a pre-determined reward distribution scheme.

As there is considerable overhead investment in the formation of groups together with devising strategies, shared rules and expectations, it is common for players to wish to remain grouped throughout their game session. For example, if a player takes a comfort break, then in most instances, the entire group will remain in position and wait patiently for their return. To this end, if a player unilaterally breaks away from a guild, it is generally considered selfish and inconsiderate as the group is then forced to spent time finding a replacement or continue their battle with a weaker team.

High level dungeons and mobs are can be so challenging that small well-balanced groups could be killed in a single strike and therefore some high level combat can only be successfully accomplished by complex, multi group, collaborative raid groups. Raiding is a common activity for high level players and is normally the sole activity for gamers who have reached the maximum possible level (85). As the game does not permit further increase of skills or introduce new abilities, the only avenue remaining is to enhance a characters gear. The majority of raid events and bosses require that raid members have particular levels of gear

and skill sets (e.g. healing ability). In addition, many raids require players to embrace sometimes unique tactics, which by default often excludes smaller groups from participating as they do not have the diversity of characters and prerequisite skills to be successful against high-level targets. High level raids contain both extremely challenging and rewarding game content that is specifically designed to keep maximum level gamers engaged. Given the unique requirements of many raid encounters, raid groups often require several attempts to defeat the enemy target.

Raiding is considered to be a very time consuming activity. Indeed, in World of Warcraft, raiding typically takes 3 to 4 hours on average once a group is ready and can take much more time over many sessions to reach that point. In essence, raiding can consume as much time as permitted by the player's practical real world constraints such as work, school and family commitments. Figure 3 shows a screenshot taken during a large raid. The upper right corner shows the 'raid' window displaying the participants and their respective roles. In the lower left corner is the raid chat channel where all raid members could communicate in the text based chat facility.

Figure 3 - Raid in World of Warcraft

Guilds with a large player population (e.g. 100+) are often able to generate enough participants at comparable character levels to tackle difficult zones and mobs. As World of Warcraft is a persistent environment, guilds use a regular raid schedules to ensure the requisite numbers of players are logged into the game at the same time. The opposite to guild raids is Pick Up Group (PUG) raids which are typically formed spontaneously through a combination of built in player search functions, advertisements in chat channels, referrals and word of mouth. PUG raid are generally less common as it is difficult to assemble a large number of players with complementary skills, expertise and character levels.

The majority of mechanisms and practices used by groups equally apply to raids, except that the co-ordination costs associated with raiding increases significantly for two main reasons. Firstly, raid groups can hold up to a maximum of 40 people at similar levels with complementary skills, expertise and abilities. In this scenario, raiding could only take place after a serious of organisational processes, which increase exponentially with the size of the guild. Examples include, location of raid, identifying a group of eligible players, screening players and deciding who should be included, resolving conflicts between players, organising included players into sub groups, travelling to the raid zone, defining the loot distribution scheme, establishing rules and undertakings and assigning individual roles and responsibilities. Given the vast amount of organisation work that is required, some raids take hours to prepare for battle. In the case of pre-scheduled raids where players have signed up ahead of time, most raid groups require participants to check in at least 30 to 60 minutes before the raid starts to allow sufficient time for preparation.

Secondly, the co-ordination requirements are significant because high level raiding battles are amongst the most difficult in World of Warcraft. The high probability of death creates a corresponding need for sophisticated planning, deployment and combat strategies. In general, a successful battle is typically preceded by lengthy discussions of tactics, strategies and deployment, extensive research of the enemy target and mobs, many failed attempts and team evaluation, reflection and improvement in the event of failure. Discipline and teamwork are integral parts of guild membership and players are expected perform exactly as instructed by the leader whilst acting in the best interests of the raid and align their actions with those of their fellow team members. Absconding, not responding to instructions, suboptimal

performance or leaving the game for a period of time during a raid could result in failure wasting many hours of team effort.

In light of the complexities and organisational challenges associated with raiding, the opportunity to participate in raids is often subject to strong competition, especially groups with strong leaders and well balanced team members. Factors such as experience, seniority, competence and team spirit provide competitive advantages for players seeking positions within raid groups. Due to the high co-ordination costs it is common for WoW group leaders to select people who they know personally or have previously raided with, not only for reasons of performance but also for reliability and building a reliable, cohesive, trusted team. Indeed, membership of such raid groups becomes stronger over time as members deepen their social ties through repeated collaboration.

3.6 Third Places in MMORPGs

Computer mediated communication in MMORPGs proffer new ways of conceptualising the relationship between one's physical location and communities. The advancement of transportation and communication technologies has facilitated the formation and maintenance of social connections among spatially dispersed individuals (Mok and Wellman, 2007). The MMORPG platform connects individuals drawn together more by communalities of interest as opposed to accidents of proximity. Indeed, as Wellman and Gulia (1999) assert communities online and MMORPGs are formed not around physical neighbourhoods, but around geographically dispersed social networks comprising of family, friends and most

importantly people of similar interests. To this end, the traditional shared physical 'place' is no longer a central element in the creation and maintenance of communities.

With the absence of "accidents of proximity", the Internet and more specifically MMORPGs seem to embody a new type of meeting place in the online world, where groups of likeminded individuals are drawn together and socialise in a relaxed and welcoming atmosphere (Shen, 2010). Oldenburg (1999) puts forward the notion of "third places" which describes certain classes of public settings that are different from a person's home or work environment, including bars, cafes and shops. Indeed, Oldenburg defines the following eight characteristics of third places:

- **Neutral Ground** – Third places are neutral grounds where individuals are free to come and go as they please with little obligation or entanglements with other participants.
- **Leveler** - Third places are spaces in which an individual's rank and status in the workplace or society at large are of no import. Acceptance and participation is not contingent on any prerequisites, requirements, roles, duties, or proof of membership.
- **Conversation is Main Activity** - In third places, conversation is a main focus of activity in which playfulness and wit are collectively valued.
- **Accessibility and Accommodation** - Third places must be easy to access and are accommodating to those who frequent them.
- **The Regulars** - Third places include a cadre of regulars who attract newcomers and give the space its characteristic mood.
- **A Low Profile** - Third places are characteristically homely and without pretension.

- The Mood is Playful - The general mood in third places is playful and marked by frivolity, verbal word play, and wit.

- **A Home Away from Home** - Third places are home-like in terms of Seamon's (1979) five defining traits: rootedness, feelings of possession, spiritual regeneration, feelings of being at ease, and warmth

Keeping in mind the similarities between MMORPGs and Oldenburg's third places such as bars and cafes, several scholars have suggested that the Internet and in particular MMORPGs can be understood as "virtual third places" (Duchenaut et. al. 2007; Steinkuehler and Williams, 2006). To this end, game researchers point out that MMORPGs differ from other online social domains such as forums and text based chat facilities in that Massively Multiplayer Online Role Playing Games provide physicality through a rich three dimensional gaming environment (Chen et. al. 2008; Ducheneaut et. al. 2007). Indeed, according to Taylor (2006), the sense of "place" in online gaming arenas is particularly salient as social interactions are framed around specific in-world locations. For example, many World of Warcraft gamers meet at Auction Houses (AH); one of the many public settings that help to foster and develop vibrant online communities. Steinkuehler and Williams (2006) assert that MMORPG worlds meet all of the criteria to be classified as "third places". To this end, their observations found that MMORPGs are conducive for the development of weak connections with diverse populations, or bridging ties, but strong and substantive relationships or bonding ties, can be less common.

3.7 Exploring the Opportunities and Risks in MMORPGs

Since the introduction of Massively Multiplayer Online Role Playing Games, many scholars have researched and discussed a number of opportunities and risks within the online gaming environment. As the following literature review will demonstrate, the opportunities and risks identified in both previous and current research focus on a limited subset, namely, MMORPGs in education, social interaction, addiction and violence to name a few.

Having explored the social dynamics, motivations, structural characteristics and communities in World of Warcraft, this chapter continues with a literature review of the opportunities and risks in MMORPGs.

3.7.1 Opportunities

Prior research has explored some of the wide ranging opportunities in Massively Multiplayer Online Role Playing Games namely, education and learning; social interaction, teamwork, co-operation and communication; exploration and role playing of new identities; creativity; giving and seeking support; commercial opportunities; and skill development.

3.7.1.1 MMORPGs as Skill Development and Educational Tools

It is commonly acknowledged that online gaming is regarded by many as a mindless activity enjoyed by both adults and children, which carries little educational value. However, advocates of online games and more specifically Massively Multiplayer Online Role Playing Games (McGonigal, 2011) assert that these environments not only provide stimulating challenges, epic victories and exhilarating rewards but also develop gamers' problem solving skills, co-operation and team work abilities. Indeed, McGonigal (2011) even argues that online

games can be used to improve the quality of people's daily lives and fighting social problems such as depression and obesity.

Turkle (2011) asserts that a society now exists where children and adults are growing up in an environment where continued simulation is the norm and people find the need to remain connected through technologies such as mobile phones, laptops, instant messaging, text messaging and email. To this end, Turkle (2011) states that traditional teaching methods, techniques and resources should use and include various stimulations that can keep learners engaged, in order to maximise their potential learning experiences.

MMORPGs have increasingly begun to be used as tools to develop skills and knowledge through simulated hands-on experiences and a significant body of literature exists supporting the notion that online games could be effectively used as educational tools (Paraskeva et al, 2010). Various terms have been coined to describe the use of online games as educational tools, including "edutainment" and "educational games". Denis and Jouvelot (2005) state that edutainment is grounded on didactical and linear progressions and no place is left to wandering and alternatives. Educational games, however, require strategising, hypothesis testing, or problem solving usually with higher order thinking rather than rote memorisation or simple comprehension (Dondlinger, 2007). Prensky (2001) defines the key characteristics of online games as: rules, goals and objectives, outcomes and feedback, conflict (and/or competition, challenge, opposition), interaction, and presentation of story.

According to Pierce (2007), World of Warcraft is one such environment that not only offers excitement and engagement to its inhabitants but also a chance to develop critical skills

essential for successful living in the real world. In the case of WoW, the underlying goal is the evolution of skills and strategies, and not solely the mastery of game controller triggers and quick reflexes to repeatedly shoot enemy targets.

Manninen (2003) points out that one of the central elements in multiplayer games is that the interaction enables players to communicate and collaborate in the game sessions. To the end, Gentile and Gentile (2005) claim that from a cognitive approach to learning perspective, the knowledge and skills learned and practiced are more likely to transfer than when practiced on a single kind of problem. Once mastered, the knowledge and skills are practiced further to provide over learning, leading to the automation and consolidation in memory; thereby enabling the learner to focus consciously on comprehending or applying new information. According to Gee (2003) games place the learner in the role of decision-maker as well as pushing players through increasingly harder challenges, enabling learning through trial and error. In addition, Kirriemuir (2002) states that games provide participants with immediate feedback on their actions and decisions which in turn encourages exploration and experimentation. Games and more specifically MMORPGs are sequenced in levels of increasing difficulty, complexity and pace, with success at current and subsequent levels contingent upon skills and competencies learned and mastered at previous levels; therefore suggesting that MMORPGs could be effectively used as educational tools because they encompass clear objectives, often set at varying difficulty levels to adapt to the prior knowledge and skills of each learner (Gentile and Gentile, 2005). In line with incremental increases in difficulty, the pace of activities can be adjusted for faster or slower learners, novices or experts, delivering differentiated instruction and learning (Prensky, 2001). To this end, Pierce (2007) asserts in the case of World of Warcraft, that more experienced gamers

adopt a mentoring role with less experienced players, facilitating peer-to-peer learning whilst further engaging participants. MMORPGs are by their very nature both entertaining and engaging, thereby motivating players using a combination of fun, stimulating and varying challenges, instant visual feedback within a complete, interactive virtual playing environment, whereby surrounding sensory information creates an immersive experience, sustaining interest in gaming arena (Mitchell and Savill-Smith, 2004; Yee, 2006; Hussain and Griffiths, 2009).

Klawe (1994) proposed that games encourage learners who may otherwise lack interest or confidence. Complex games, such as MMORPGs, have the potential to support cognitive processing and the development of strategic skills and Natale (2002) asserts that complex games help to increase users' learning and recollection capabilities, thereby encouraging greater academic, social and computer literacy skills. The foregoing evidence highlights some of the key potential benefits of embracing MMORPGs in the processes of teaching and learning as games can teach young people in a fun, engaging, motivating, interesting and encouraging way. To this end, MMORPGs can facilitate the teaching of complex information which could otherwise be too difficult to learn in a traditional classroom. Using MMORPGs, Knowledge can be adjusted for different types of learning and lead to the development of strategic skills through experimentation and trial and error (Paraskeva et al. 2009).   In addition, Winther (2010) proposes that skills acquired and developed in the MMORPG world are perceived as valuable in the workplace; with one participant in the study stating:

"Recently, I have felt myself more confident in real life, leading and instructing, because that is one of my roles in the Guild – having to guide people in the healing of

raids. I think this is something that is really going to help me at work where following promotion I will have to instruct people on what to do and when to do it. Telling people what their tasks and objectives are and the best way of doing that in the world will be invaluable" (Winther, 2010, p.21).

The potential benefits of using MMORPGs as an educational tool carry certain conditions, one of which is time management and frequency of play. In a study undertaken by Ip et al. (2008) which investigated gaming frequency and academic performance, the authors found, through correlation analysis, that frequent gamers generally achieved lower scores in academic assessment than less frequent gamers, suggesting that the potential benefits could be outweighed by excessive use which scholars (Hussain and Griffiths, 2009; Mitchell and Savill-Smith, 2004) suggest would have a detrimental impact on the individual. Therefore, Paraskeva et al. (2009) assert that game use should be controlled in order not to distract learners from their core responsibilities (e.g. homework) and should be used as a supplement to enhance the learning experience. Thus, it has been suggested (Paraskeva et al. 2009; Ip et al. 2008) that MMORPGs should be developed in such a way that it would not be possible to play indefinitely, perhaps by incorporating elements that necessitate a classroom session or recourse to an external source of information before proceeding to the next stage.

In summary, it has been suggested that games and more specifically MMORPGs increase digital literacy skills (Pierce, 2007), and present a variety of challenges (Hussain and Griffiths, 2009) of varying complexity whilst embracing multiple communication methods (Chen, 2009). Evidence highlights the potential benefits of embracing games as educational tools (Paraskeva et al. 2009) together with their ability to develop communities, leadership and negotiation skills and foster social interaction and support (Chen, 2009). MMORPGs can be

effectively used a pedagogical tool but such benefits are subject to certain conditions such as frequency of gameplay (Ip et al. 2008; Anand, 2007). Evidence from current literature suggests that actual real-life skills can indeed be learned in virtual settings and demonstrates that MMORPGs could be used as effective educational mediums. Furthermore, Yee (2006) suggests that online games facilitate "emergent learning" where the pedagogy is not dictated as in traditional training software, but emergent in the sense that it occurs because of the rich system mechanics.

3.7.1.2 Identities and Avatars

Social interaction is a negotiation of identities between people in a given environment and a person's identity is comprised of both a personal internal identity and a public social identity. During social engagement, people project aspects of their internal identity into a social identity for others to perceive. Depending on the situation at any one time, people only present a particular facet of their internal identity to others (Boyd, 2002). The process of self-monitoring varies to a greater or lesser degree during social interaction with the goal of managing the impressions that others perceive, to present the appropriate information at the appropriate time. Whilst assessing what is appropriate, people draw from situational and interpersonal contextual cues and through understanding the social implication of context cues and perceiving others' reactions, the individual is given social feedback to adjust their behaviour that best fits the situation, thereby hoping to be perceived in the best light (Winther, 2010; Boyd, 2002). Throughout social engagement, people continually draw from their own personal experiences to perceive others and the environment whilst projecting

aspects of their identity that they deem appropriate for a particular situation. Boyd (2002)

points out that negotiation between the two happens with little conscious effort.

Social interaction in online digital environments differs from that of traditional interaction

scenarios as the underlying architecture of the digital arena does not provide the forms of

feedback to which people have become accustomed. The lack of visual cues makes it difficult

to present oneself and to perceive the presentation of others. Indeed, as people

communicate through digital environments, there is a corresponding requirement to

articulate the presentation of the self in new ways. The interface of digital environments is

markedly different to that of traditional physical architectures with the former being

composed of bits and the latter composed of atoms. Unlike real world environments, online

digital arenas are explicitly designed around user's desires and preferences and as a result

create differences of interpersonal expectations, social norms and paradigms of use (Mayer-

Schonberger, 2011; Boyd, 2002). Indeed, online interaction requires users to be aware of and

adjust to these aforementioned differences in order to reach the same level of social

adeptness previously learnt in the offline world.

Massively Multiplayer Online Role Playing Games provides players with the ability to create

an idealised visual representation of their self in the form of an avatar. For some players,

their avatar becomes a purposeful projection or idealisation of their own real life identity,

while for others; the avatar provides an opportunity to experiment with new identities. While

some argue that cyberspace frees players from their physical bodies and provides freedom

over identities, gender stereotypes and national affiliations transfer into these online gaming

environments where male and female bodies are equal and where real world nations do not

exist. Thus, cyberspace enables the building of new identities, decided by the individual players according to their real identities or there otherwise socially preferred identities. Moreover, Yee (2011) asserts that virtual worlds provide a vehicle in which players can transfer real world privileges, affiliations and power structures from the real world into the online area. This is reflected, for instance, in the differences in the character customisation available for the Asian versus the western MMORPGs. As noted, as opposed to the complete character customisation option available to the western MMORPGs, their Asian counterparts only provide a partial customisation feature. This scenario has often been related to a much broader concern pertaining with the individualism versus the egalitarian debate.

MMORPG's such as World of Warcraft provide a platform for the use of non-visual cues in addition to user controlled visual cues such as avatar facial expressions and subtle gestures. Williams et al (2007) examined the effects that the inclusion of voice with text had on players of WoW and found that voice capabilities increased players' trust and liking of each other. Thus, voice can be seen to play an equally important role in the MMORPG environment along with text. MMORPG environments provide users with the ability to alter the emotive state of their avatar using specific words or emoticons inputted using text based commands (World of Warcraft, 2013).

The chosen avatar's appearance is claimed to be a determinant of the expected behaviours and attitudes inferred by people, which has been referred to as the Proteus Effect (Yee and Bailenson, 2007). For example, in an experiment by Yee and Bailenson (2009), users who were given taller avatars negotiated more aggressively than users who were given shorter avatars. Moreover, their study concluded that the appearance of virtual bodies changed the

way in which players interacted in both the online gaming environment and in subsequent face-to-face interactions. Therefore, a change in an avatars appearance not only changes the behaviour of the individual player but also the behaviour of others with whom they interacted with. Early research into MMORPG's and identity (Barlow, 1996; Turkle, 1995) often used metaphors such as liberation and fluidity as descriptors of these environments, however, more recent studies (Eisenbeiss et al, 2012; Yee et al, 2007) demonstrate how porous and entangled the virtual and physical world are. Indeed, Yee and Bailenson's (2009) study into transformed representation found that the virtual and physical self cannot be truly liberated from each other and what is learnt in one body is shared with other bodies that are inhabited, whether that be virtual or physical.

Integral to the topic of identity and avatars is that of gender swapping. Gender swapping is the term used to describe when a player within the context of the gaming environment plays a gender opposite of his or her own (Lou et al, 2013). Griffiths et al (2003) founds that two thirds of MMORPG players had experienced gender swapping and Zaheer et al (2008) found that many male users engage in gender swapping because they want to enjoy females' advantages in society as they expect a female avatar to be treated more courteously than a male character. Wang and Wang (2008) also found that male players tend to show more pro-social behaviour towards females. Conversely, females were found to show more pronounced behavioural changes when they swapped genders, by acting in a more masculine manner than the average male (Huh and Williams, 2010). Indeed, while socialising as female avatars, females were shown to focus heavily on achievements in related activities (e.g. combat, hunting) as male avatars (Bartle, 1996). The players' personalities and strategies in the online gaming world depend on their assumed identity. In summary, there are a myriad

of reasons why players choose to gender swap their character ranging from aesthetic preferences to in-game benefits.

3.7.1.3 Creativity

This section discusses the creative opportunities that MMORPG's present to end users. Popular Massively Multiplayer Online Role Playing Games such as World of Warcraft have opened their software through Application Programming Interfaces (API's) to enable user modification. Commonly known as 'modding' amongst online gaming communities; end users are able to alter commercial hardware and software products thereby empowering them to participate in the evolution and development of their online gaming world. In general, 'mods' are restricted to the alteration of a limited set of user interfaces, functions and game contents, however, despite these limitations, they are extremely popular with players and millions of players download and use them to enhance their playing experience (Sotamaa, 2003; Postigo, 2008; Kow and Nardi, 2009).

The term 'modders' is typically used to describe technically minded players who create add-ons or 'mods' either for fun or occasionally for monetary gain. Modders generally form communities to help each other in their creative tasks and such communities typically hold their own ethics and interests that do not necessarily coincide with a corporate agenda (Malaby, 2006). In order to align modding to corporate agendas, game companies govern modders through rules and assessment of the impact of mods on the integrity of their games (Kow and Nardi, 2009). For example, in the case of World of Warcraft, two key policies regulate the creation of user generated content (Blizzard Entertainment, 2009):

- "Policy 1 — Add–ons must be free of charge. All add–ons must be distributed free of charge. Developers may not create "premium" versions of add–ons with additional for–pay features, charge money to download an add–on, charge for services related to the add–on, or otherwise require some form of monetary compensation to download or access an add–on."

- "Policy 5 — Add–ons may not solicit donations. Add–ons may not include requests for donations. We recognize the immense amount of effort and resources that go into developing an add–on; however, such requests should be limited to the add–on Web site or distribution site and should not appear in the game."

Kow and Nardi (2009) found that the majority of modders distribute their creations for free; however, many others setup independent websites soliciting donations. In addition, they found that many mod users bypass these independent homepages and download add-ons from sites such as Curse.com, a site that hosts thousands of different mods from a myriad of different authors.

Kow and Nardi (2009) propose a model of a 'modding' community's ethical system (Figure 7). Their study found that individual ownership encouraged modders to share their mods and code. Modders reported that despite sharing, they felt that their ownership would still be respected. The value of mods was judged through the download count. The authors found that the transfer of ownership of a specific mod would sustain creativity. The Corporate Ethical Set denotes the investors' interests, intellectual property rights and the product quality. Indeed, the game owners provide a platform for mod creation through API's and are also responsible for legal enforcement against any modder who violates the policies.
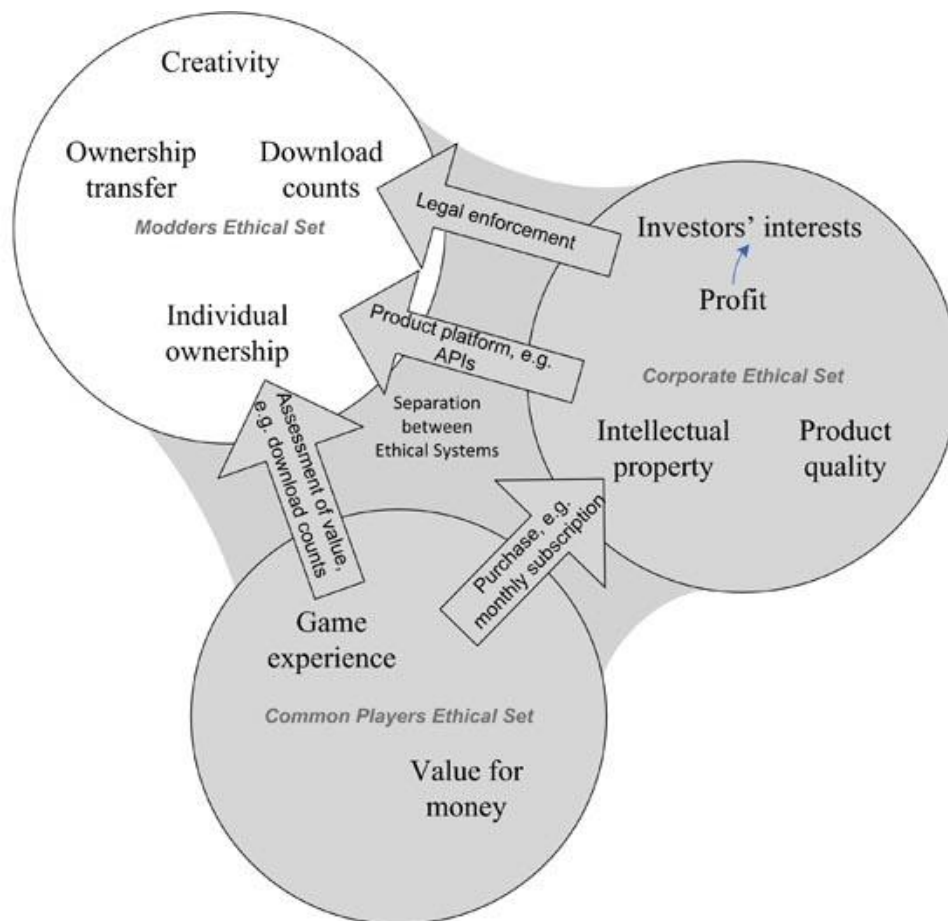
Figure 4 - Ethical systems of modders, the corporation, and players (Kow and Nardi, 2009)

MMORPG's provide players with a unique platform into which they can collaborate with like-minded people to create rich user generated content (i.e. mods or add-ons) which can enhance game play, develop technical and team work abilities and provide a sense of contribution to a community (Tokrim, 2009). Indeed, the online gaming environment is inextricably linked to the modding community and the quality of play together with the end user experience is vastly changed through the use of mods. Nardi and Kallinikos (2007) point out that whilst creative human engagement with technology should not be suppressed, it is important to ensure that risks of disruptive effects on the games operations is carefully regulated.

3.7.1.4 Commercial Opportunities

Commercial opportunities in Massively Multiplayer Online Role Playing Games are not merely constrained to end users paying monthly subscriptions to game manufacturers. Indeed, a myriad of opportunities exist for players to reap financial rewards. In the context of online gaming, two economies play an equally important role, namely; the virtual world economy and real-world economy. As these virtual worlds have grown and become increasingly more sophisticated, to the extent they now mirror the offline world, a whole new virtual economy has emerged, blurring the border between the real and the virtual.

In virtual economies, human and computer players produce goods and services, hold assets and trade them with other in-game entities, in the same fashion that people and corporations participate in real-world economies. Moreover, participants in and members of online gaming environments are now buying and selling virtual goods and services offline (not in-world) in exchange for real currency; a practice referred to as 'Real Money Trading' (RMT) (Nardi and Kow, 2010). As Camp (2007) suggests, virtual transactions have real economic value because of Real Money Trading.

According to Lastowka and Hunter (2004), an unknown number of people in online gaming environments exchange real currency and earn a living delivering virtual goods and services, thereby making it possible to "work in a fantasy world to pay rent in reality". Switzer and Switzer (2011) point out that these virtual worlds are rivalling the GNP of other countries and governments have considered taxing income and assets from virtual economies.

RMT is a huge business, particularly in the sale of in-game currency and high powered user accounts (Duranske, 2008). Although many leading MMORPG's (e.g. World of Warcraft, EverQuest) forbid the buying and selling of 'gold' (their in-world currency) or items for real money, there is ample evidence that such activities still continue (Dibble, 2006). One notable example of RMT is where individual players trade experienced, high-level characters on dedicated exchange websites (e.g. buymmoaccounts.com) in return for real-world money. Figure 6 shows a WoW character for sale for the sum of $1,339.00.

On a far wider scale, a new commercial phenomenon has emerged in virtual worlds known as 'gold farming'. Gold farming is the production of virtual goods and services for players of online games. According to Heeks (2008) gold farming organisations employ hundreds of thousands of people that earn hundreds of millions of dollars annually, with China being the epicentre of employment. Many gold farms are typically located in developing countries, providing income, jobs and skills to employees. Websites such as yehforgames.com offer a range of services including gold farming, character power levelling and selling of in-game items in return for a calculated fee payable through online merchants such as PayPal.com.

Figure 5 - RMT of World of Warcraft Accounts (buymmoaccounts.com)

Aside from the real-world monetary opportunities that MMORPG's facilitate, players learn techniques of trade and negotiation akin to real world business practices. For example, World of Warcraft incorporates Auction Houses which are places where characters can trade weapons, armour, trade goods and recipes.

Hagel and Brown (2009) highlight the potential of using World of Warcraft to train employees to think creatively and point out that WoW could be helpful to business executives as they strive to improve performance more rapidly in their own organisations. Indeed, the authors draw comparisons between the mechanics and structure of MMORPG's to training and development structures commonly observed in the real world workplace.

3.7.2 Risks

Prior studies have focused on a number of risks in online gaming environments, including predation, addiction, privacy, cyber bullying and desensitisation; each of which is explored in this section.

3.7.2.1 Predation

The media portrays that the Internet is becoming an increasingly dangerous place for children and teenagers and research suggests that most Internet-initiated sex crimes involve adult men who use the Internet to meet and seduce underage adolescents into sexual encounters. Indeed, predators use Internet communications such as instant messengers, email, chat rooms and online gaming environments to meet and develop intimate relationships with victims (Wolak et al. 2008).

Several media stories have reported predatory behaviour in online gaming environments (e.g. Zetter, 2008) however, empirical findings relating to online game initiated sex crimes remains relatively sparse.

Section 3.3 discusses the high levels of trust, commitment and interdependency between gamers within virtual worlds. It is commonly acknowledged that MMORPG's like other digital social spaces made establishing plutonic or romantic relationships possible with individuals despite a lack of face-to-face contact. As Erkenbrack (2011) points out, players can often fall in love while playing a game together and sustain long-term, serious romantic relationships, sometimes to the detriment of their offline real-world relationship. To this end, popular MMORPG's such as World of Warcraft provide a place for players to engage in a virtual marriage ceremony, further strengthening that particular social tie.

An avatars progression in MMORPG's requires a high level of interdependency, teamwork and collaboration. The beginner's guide to World of Warcraft notes that "by going it alone, you won't be able to master some of the game's tougher challenges, you will likely take longer to reach the endgame, and you won't have access to the game's most powerful magical treasures." Indeed, forced collaboration of like-minded players juxtaposed with high levels of trust and interdependency presents an emerging avenue for exploitation.

Oqvist (2009) asserts that in MMORPG's such as World of Warcraft, there are risks associated with young people accepting gifts (e.g. armor, weapons, charms) from strangers within the virtual world and notes that whilst these may not necessarily be perceived as gifts, they are. Moreover, the author points out that mentoring is an integral part of the game and although

in principal a good practice, if abused can be used as part of the grooming of children in the virtual world. The aspects of trust, mentoring and inter player dependency are illustrated in the following response from a gamers experience in World of Warcraft;

"We met in the WoW, doing a quest in a party with some other people. The way we cooperated did click and we did quests together often. My character was about 10-15 levels higher than that of hers. So I could easily protect that character and gain easy experience points to level her character." (Oqvist, 2009, p.109)

Whilst empirical findings on online game initiated predation remains sparse, the structural characteristics of MMORPG's appear to provide support for strong social ties with strangers.

3.7.2.2 Privacy

According to Westin (2003), the concept of privacy now explicitly considers the exercising of control over the flow of personal data between entities and in the context of this research, the term privacy refers to the notion of control of information about the self in online gaming environments.

Privacy has been identified as being highly subjective (Raab, 2004) and Hine and Eve (1998) put forward that individuals perceive privacy invasion based upon context. Moreover, differing factors ranging from external influences upon an individual to more internalised behavioural issues influence personal privacy.

At a first glance, risks to personal privacy in MMORPG's can fall into two categories:

- Technological Risks - Exploitation of privacy through technological vulnerabilities in the virtual environment and;

- Social Risks - Disclosure of personal and sensitive data through interactions with others

Technological exploitation of privacy refers to the use of technological tools such as hacks and key loggers to exploit vulnerabilities in the virtual environment. At the time of writing, Honorof (2013) reported that hackers had exploited a World of Warcraft app in order to steal almost 200,000 gold pieces through exploiting compromised accounts. A number of game manufacturers (e.g. Blizzard Activision) have implemented mobile token authenticators giving end users an added layer of protection to their gaming accounts. However, such safeguarding techniques have previously been exploited through malicious add-ons and social engineering. Indeed, Parrish (2010) reports how hackers created a malicious WoW add-on and used social engineering techniques to persuade gamers to download and install the exploit.

Hayes (2006) states that technological and social risks of online games should be understood by anyone who enjoys them and highlights the following threats:

- risks from social interactions with strangers who may trick players into revealing personal or financial information

- risks from computer intruders exploiting security vulnerabilities

- risks from online and real-world predators

- risks from viruses, Trojan horses, computer worms, and spyware

In addition to viruses, worms and malicious software, technological risks can also include compromised game servers. Indeed, CERT (2006) highlight the threat posed to players that engage in compromised game servers, stating that by exploiting vulnerabilities in insecure

servers, malicious users are able to control end-user computers and gain access to personal information.

Social risks refer to the use of social interaction to exploit an individual or their computer in order to carry out malicious activities. Indeed, Hayes (2006) highlights a number of social risks to players in virtual worlds including:

- capturing of personal information

- stealing of identity

- theft of credit card information

- inappropriate contact with children pretending to be another child, setting up meetings and tricking them into revealing personal information

Social engineering refers to the selection of techniques that exploit human weaknesses and manipulate people into breaking normal security procedures; typically involving people to perform atypical actions or to divulge confidential information (Mitnick and Simon, 2002). In the context of virtual worlds, where trust and inter player dependency is integral to progression in the game, social engineering poses a significant threat to gamers in MMORPG's.

Identity theft is a common threat in online gaming environments. Indeed, in 2003, approximately, 230,000 South Korean identities were stolen from the popular MMORPG Lineage. In 2011, fraudsters gained access to the Sony Playstation Network, stealing 70 million customers' details including their names, addresses, dates of birth, passwords, security questions and credit card details (Richmond, 2011).

As Keene (2012) notes, the exploitation of privacy is typically linked to financial crime and economic benefit, whether that is illegitimate gain within the virtual world (i.e. accumulation of virtual items and virtual currency) or real world monetary gain (i.e. through the sale of virtual items for real world currency). Indeed, as a result of interconnectivity between the two worlds, actions in virtual worlds have consequences in the real world.

Massively Multiplayer Online Role Playing Games have long since been associated with anonymity, where players can hide their true identity and experiment with new forms of identity and self-expression. The affordances of anonymity together with reduced social feedback and limited non-verbal cues in virtual worlds can lead to deindividuation; a theory fundamentally applied to grasp the deviation of a normal individual when in a crowd, namely the preposterous crowd behaviour (Chen et al, 2009) in which a player actively seeks the attention of other group members through attention seeking, sometimes irrational behaviour. However, anonymity in virtual worlds is no longer guaranteed. Indeed, in 2010, Blizzard Activision announced a new system called 'Real ID' which forced players to interact on their gaming forums using their real first name and surname (BBC News, 2010). This policy change was met with strong opposition with one player reporting:

"Within five minutes, users had got hold of his telephone number, home address, photographs of him and a ton of other information" (BBC News, 2010).

Prior research highlights the inextricable crossover between technological and social risks to privacy, placing onus on both the individual to maintain awareness and caution within the

MMORPG world and online gaming companies to maintain their social responsibility in safeguarding consumers personal and sensitive data.

3.7.2.3 Desensitisation

Desensitisation theory is defined as the diminished emotional responsiveness to a negative or aversive stimulus after repeated exposure (Yates, 1998). Desensitisation is a term that has long since been used by scholars to measure the psychological effects of exposure to violence or violent scenes. Carnagey et al. (2007) defines desensitisation as "a reduction in emotion-related physiological reactivity to real violence".

Experiments by Engelhardt et al (2011) demonstrated a causal link between exposure to violent scenes and images and aggressive behaviour. Prior studies (Funk et. al 2004; Rule and Ferguson, 1986) show that repeated exposure to violence results in habituation of the initially negative cognitive, emotional, physiological responses people experience when they see blood and gore. Furthermore, desensitisation theory is supported by research showing that violent media exposure is associated with decreased cardiovascular (Carnagey et al. 2007; Linz, 1989), electrodermal (Cline, 1973), neural (Bartholow, 2006) and empathic responses (Fanti et al 2009) during depictions of real violence. To this end, Huesmann and Kirwil, (2007) assert that exposure to violent media can reduce aggressive inhibitions and empathy for the pain and suffering of others (Mullin and Linz, 1995). Huesmann et al (2003) claims that desensitisation to media violence is believed to take a long time, occurring over numerous repeated exposures. In contrast, however, other experiments have demonstrated that participants who play violent video games for just 20 minutes showed signs of desensitisation (Carnagey et al, 2007; Fanti et al, 2009).

Adachi and Wiloughby (2013) found that video game competition predicted higher levels of aggression than video game violence, suggesting that competitiveness had a greater effect on an individual's level of aggression than exposure to violence.

It is commonly acknowledged that violent video games have been labelled as an influencing factor in many real world acts of violence. Indeed, media reports suggest that many perpetrators of massacres were video gamers who seemed to be acting out a dark digital fantasy (Carey, 2013). The debate on the effects of video game violence on real world aggression and violent behaviour prompts conflicting arguments. The mass media has often attributed acts of violence with video gaming; however, such statements are rarely supported by empirical findings. To this end, studies by Ferguson et al (2008) found no correlational link between video gaming and acts of violence in the real world, thereby questioning the aforementioned common belief.

Massively Multiplayer Online Role Playing Games, by their very nature, expose players to acts of violence, whether that is in combat with game generated content or other real life players (Lehdonvirta, 2010). Hayes (2007) discusses two forms of aggression in MMORPG's, namely protection schemes and virtual mugging. Protection schemes is likened to organised crime in online gaming environments, where virtual protection gangs have been observed warning weaker players against negative consequences unless virtual or real protection money is paid. Virtual mugging is a term used to describe when a player uses software 'bots' to attack and rob characters of their virtual possessions and then exchanges the stolen items for real money.

Aggression manifests in a number of forms in online gaming environments and new terms have been coined to describe emerging types of behaviour. Griefing refers to players who typically stalk, hurl insults, extort, form gangs, kill and loot (Pham, 2002). Moreover, griefers can be summarised as those who like to cause other gamers to enjoy their game less (Foo and Koivisto, 2004). Foo and Koivisto (2004) investigated grief play motivations and proposed a four-category taxonomy; three categories (game influenced, player influenced and grief influenced) are externally influenced whilst one category (self) is internally driven:

- Game influenced: Factors oriented around the game world and its operation. Factors including anonymity, boredom, greed, protest, testing and game premise.

- Player influenced: Factors oriented around other non-griefers in the games. Factors including spite, victim, vulnerability and revenge.

- Grief influenced: Factors orientated around other griefer's in the games. These factors include ritualization and group identity and reputation.

- Self: Factors oriented around the griefer's personality and his desire to immerse in the character. These factors include bad mood, wanting to feel powerful, attention, enjoyment and role-playing.

Trolling is a term given to users who intentionally provoke or antagonise others in an online environment in order to elicit a generally negative or violent reaction (Willard, 2007). In an exploratory study by Thacker and Griffiths (2012) it was found that frequent trolls were young males who played their online game for a long period of time. The types of behaviour exhibited included griefing, sexism, racism and fake/intentional fallacy. Motivations for trolling include amusement, boredom and revenge. Furthermore, the authors found that trolling was positively associated with self-esteem, whereas experiencing trolling was negatively associated.

Desensitisation theory has been applied to a number of behaviours including sexuality. Indeed, Millin and Linz (1995) examined the effects of repeated exposure to sexually violent films on emotional desensitisation and callousness toward domestic abuse victims. Their study found that that repeated exposure to sexual violent scenes iminished participant's emotional response and self-reported physiological arousal.

Despite the strict terms and conditions of use imposed by some MMORPG companies, online gamers are exposed to sexual acts in virtual worlds. Moderation and restrictions of such acts vary between gaming worlds; for example, in Final Fantasy Online game masters and moderators are often found taking part in virtual world cybersex, whereas World of Warcraft is moderated based on player reports and feedback.

Hayes (2006) used the term cyber prostitution to describe a virtual brothel setup in The Sims Online, whereby players exchanged cybersex for virtual currency (known as Simoleons). In a report by Krotiski (2005), the author discusses how a World of Warcraft player auctioned an hour of their time in the MMORPG for the top bidder to do anything they wanted together. The listing description shown below was auctioned through eBay and the seller's eBay ID was shown as 'jailbait15':

"What you are bidding on is one, in game, hour of my time. During that hour I will do anything you ask of me that is possible using emote, character control and chat interface. The winning bidder can either roll a character on my server, or I'll roll one on your server. We will set up a day and time to meet and spend our hour together. I have several sexy outfits I can wear for you and getting new ones every day. I love to dress up <3. You are welcome to take screenshots

and make movies of our time together. I am very photogenic! Good Luck! I can't wait to meet

you!"

Sexual scenes and erotic role play is prevalent in Massively Multiplayer Online Role Playing Games. Moreover, the risks associated with sexual desensitisation to vulnerable individuals are not limited to merely repeated exposure. Indeed, the report by Krotiski (2005) indicates that underage young people are actively engaging in role play, whether that is for amusement, stimulation or monetary gain. To this end, figure 7 shows a screen shot of two avatars engaged in sexual role play in World of Warcraft.

Figure 6 - World of Warcraft Sexual Role Play (Newitz, 2007)

3.7.2.4 Addiction

According to Marlatt et al (1988), addictive behaviour is a repetitive habit pattern that increases the risk of disease and/or associated personal and social problems. Addiction is often experienced subjectively as 'loss of control' and these habit patterns are typically characterised by immediate gratification (short term reward); often coupled with delayed,

123

deleterious effects (long term costs). Moreover, attempts to change an addictive behaviour (via treatment or by self-initiation) are typically marked by high relapse rates.

In recent years, the problematic use of online games has received increased attention, not only from the media, but also from psychologists, psychiatrists, mental health organisations and gamers themselves. Prior studies from different cultures suggest (Yousafzai et al., 2013) that 7-11% of gamers seem to be having real problems to the point that they are considered pathological gamers (e.g. 8.5% in Singapore: Gentile, 2009; 10.3% in China: Peng and Li, 2009; 8% in Australia: Porter et al, 2010; 11.9% in Germany: Grusser et al, 2007; and 7.5% in Taiwan: Ko, et al, 2007). Kim (2006) found that some gamers reported to have been playing for 40, 60 and even near to 90 hour gaming sessions. Moreover, the American Medical Association indicated that up to 90% of American youngsters play online video games and as many as 15% of them (equating to 5 million children) may be addicted (Young, 2009). In 2005, the BBC reported that a 28 year old South Korean man died after playing the MMORPG Starcraft in an Internet café for 50 hours continuously (BBC, 2005).

Some argue that it is difficult to distinguish between healthy and unhealthy usage of online games, however, Ferguson et al (2011) point out that there is sufficient evidence to describe some excessive gaming as problematic and/or addictive when it pervades and disrupts other aspects of life. Research suggests that some gamers are struggling to keep their playing habits under control and consequently compromise their academic achievement (Chiu et al., 2004; Skoric et al, 2009), real life relationships (von Wahlde et al, 2006), family relationships (Griffiths et al, 2004;), physical health (Dworak et al, 2007), and psychological wellbeing (Lemmens et al, 2011).

In some cases the symptoms experienced by pathological online gamers are identical to substance addicts, namely, salience, mood modification, craving and tolerance (Chiu et al, 2004; Hussain and Griffiths, 2008). To this end, Griffiths (1995; 1996; 2005) argues that technological addictions are a subset of behavioural addictions and that behavioural addictions feature the core components of addiction. Indeed, the diagnostic criteria for addiction incorporate the following six core components:

- *Salience*

This occurs when the particular activity becomes the most important activity in the person's life and dominates his or her thinking (preoccupations and cognitive distortions), feelings (cravings), and behaviour (deterioration of socialised behaviour). For instance, even if the person is not actually engaged in the behaviour, he or she will be thinking about the next opportunity to do so.

- *Mood Modification*

This refers to the subjective experiences that people report as a consequence of engaging in the particular activity and can be seen as a coping strategy (i.e. they experience and arousing "buzz" or a "high" or paradoxically tranquilising feel of "escape" or "numbing").

- *Tolerance*

This is the process whereby increasing amounts of the particular activity are required to achieve the former effects. For instance, a gambler may have to gradually have to increase the size of the bet to experience a euphoric effect that was initially obtained by a much smaller bet.

- *Withdrawal Symptoms*

These are the unpleasant feeling states and/or physical effects that occur when the particular activity is discontinued or suddenly reduced (e.g. the shakes, moodiness, irritability, etc.)

- *Conflict*

This refers to the conflicts between the addict and those around them (interpersonal conflict) or from within individuals themselves (intrapsychic conflict) that are concerned with the particular activity.

- *Relapse*

This is the tendency for repeated reversions to earlier patterns of the particular activity to recur and for even the most extreme patterns of typical of the height of the addiction to be quickly restored after many years of abstinence or control.

Lemmens et al (2009) discuss a further (seventh) criterion for the diagnosis of behavioural addiction:

- *Problems*

This refers to problems caused by excessive game play. It mainly concerns displacement problems as the object of addiction takes preference over activities, such as school, work, and socialising. Problems may also arise within the individual, such as intrapsychic conflict and subjective feelings of loss of control.

The term gaming addiction has long since been the subject of debate between psychology scholars, with some advocating that addiction is recognised as a psychological disorder in

diagnostic manuals (Griffiths, 2012; Young, 2013) and others assert caution against inclusion as science behind such an illness is not fully understood (Knox (2013). Behavioural addictions are a specific group of mental and behavioural disorders. The Diagnostic Statistical Manual of Mental Disorders v5 (DSM-V) now incorporates Internet gaming addiction into Section 3 (Emerging Measures and Models); a section which contains diagnostic categories that require further research. It is worth noting here that the DSM-V serves as a universal authority for the diagnosis of psychiatric disorders (Moran, 2013; Grant et al 2011).

Griffiths (1996; 2003) asserts that behavioural addictions can be classified as disorders that do not typically involve the ingestion of a psychoactive substance but in extreme cases lead to symptoms commonly experienced by substance addicts, namely; salience, mood modification, craving and tolerance (Kuss and Griffiths, 2012).

It is commonly acknowledged that online gaming is particularly appealing to children and adolescents, therefore it is reasonable to suggest that these groups may be particularly at risk (i.e. more vulnerable and susceptible) of developing gaming addiction (Griffiths, 2012). Indeed, developmental psychopathological findings indicate that addictions tend to have precursors during adolescence (Griffiths, 2011) and it is relatively common that most dependencies develop in early adulthood (Griffiths, 2011). To this end, there is a corresponding need to establish prevention efforts that target adolescents who have their first experiences with addictive substances and behaviours during puberty. Wolfling and Muller (2009) point out that parental influence is typically diminished whilst peer group influences gain more importance. Furthermore, peer pressure may lead to a variety of

problems that may result in the development of pathological behaviours, such as chemical and behavioural addictions.

Lemmens et al (2009) developed and validated a Game Addiction Scale (GAS) based on the diagnostic criteria for pathological gambling (i.e. salience, mood modification, tolerance, withdrawal symptoms, conflict, relapse and problems). Many studies on game addiction have used these criteria which can be found in various versions of the DSM (APA, 1980, 1994, 2004, 2012) to define and measure pathological game use. By adapting six or seven of these pathological gambling criteria, researchers have developed different scales to measure game addiction (Charleton and Danforth, 2007; Chou and Ting, 2003; Fisher, 1994; Griffiths, 1997; Griffiths and Dancaster, 1995; Griffiths and Hunt, 1995, 1998; Grusser et al. 2005; Hauge and Gentile, 2003; Phillips et al. 1995; Salguero and Moran, 2002). Other studies that were specifically aimed at measuring addiction to online gaming, have often adapted an 8-item scale developed by Young (1996) for the diagnosis of Internet addiction (Chak and Leung, 2004; Ko et al. 2005; Rau et al. 2006; Yee, 2006). Moreover, Young's model for Internet addiction is also based on the clinical definitions of pathological gambling found in DSM-IV (APA, 1994). The World Health Organisation (1993) developed the ICD-10 diagnostic criteria for pathological gambling, which has previously been adapted for online gaming addiction studies (Grusser et al, 2007; Thalemann et al. 2007). In addition, other scholars have developed their own set of criteria to define and measure game addiction (e.g. Chiu et al, 2004; Ng and Wiemer-Hastings, 2005; Wan and Chiou, 2006).

The Game Addiction Scale (GAS) (Lemmens et al, 2009) consists of 21-items and was developed and validated to test whether the seven pathological gambling criteria formed a

second-order construct for game addiction. Three items were developed for each of the seven criteria, namely; salience, mood modification, tolerance, withdrawal symptoms, conflict, relapse and problems. The authors found the prevalence of game addiction depended on the method used to determine when someone is addicted. The two formats used to determine game addiction when using the seven point DSM-based diagnostic criteria are polythetic and monothetic. According to Lemmens et al (2009), the polythetic format requires addicts to endorse half (or more) of the proposed criteria, whereas the monothetic format requires endorsement of all of the proposed criteria. The authors argue that using the polythethic format is likely to lead to overestimation of the frequency of addicted gamers. Indeed using the polythetic format, researchers reported a high number of addicted players; 16% (Griffiths and Hunt, 1997), 20% (Griffiths and Hunt, 1998) and 39% (Charlton and Danforth, 2007). In contrast, when Charlton and Danforth (2007) applied the monothetic format to their sample, they found that 1.8% of their respondents were categorised as addicted gamers, which is proportionate to the estimated percentage of pathological gamblers (Walker and Dickerson, 1996).

Recent studies provide empirical evidence that gaming addiction exists. As Ferguson et al. (2011) point out, while it may be difficult to distinguish between healthy and unhealthy usage of online games, there is sufficient evidence to describe some excessive gaming as problematic and/or addictive when it pervades and disrupts other aspects of life, thereby making it an issue worthy of extensive investigation (Kuss and Griffiths, 2012).

3.8 Conclusions

Earlier in this section, the dynamics of online gaming communities was explored together with the contextual influences on inter-player social interaction. Structural characteristics of online games were found to alter the dynamics of social interaction and issues surrounding trust and commitment between players were discussed revealing that players are typically highly committed and loyal to fellow team members. The chapter continued with a discussion on the motivations of play, showing that players are motivated by different facets of MMORPG's which in turn shapes their behaviour in the online arena.

The mechanics, content and structure of World of Warcraft was explored, together with social interaction, communication methods and the formation of guilds. Third places in MMORPGs were introduced highlighting how virtual worlds mimic living in the real world and thus enabling players to live an 'alternative' and optimised lifestyle.

The myriad of opportunities in MMORPGs were explored, demonstrating how virtual worlds can be used to elicit positive outcomes such as utilising these domains as pedagogical tools and facilitating skill development. Exploring the use of avatars together with their creation and customisation highlighted how players use the online gaming arena to explore alternative identities and behaviours. Indeed, virtual worlds such as World of Warcraft, present challenges, promote leadership, teamwork and negotiation skills. In addition, the users are also found to enjoy the creative aspects of gaming, from customising their own avatar to developing user-generated content with the aims of enhancing gameplay and contributing to their community.

The discussion surrounding commercial opportunities explored the various means in which players generate both virtual and real world currency. The literature suggests that online gaming arenas act as a catalyst for entrepreneurial activities.

An examination of the literature surrounding the most commonly acknowledged risks in online gaming environments highlighted a number of potential negative consequences including, predation and exploitation, loss of personal and sensitive data and desensitisation to violent and sexual scenes. The most widely debated risk of addiction in online games and the theories of diagnosis and measurement were analysed.

An analysis of the literature demonstrates a cross over between the opportunities and risks; highlighting that neither should be considered in isolation. Furthermore, the probability and impact of encountering both opportunities and risks in online games are to a greater or lesser degree influenced by contextual factors.

Chapter 4 explores two of the most commonly acknowledged and reported risks in online gaming environments, namely behavioural addiction and the disclosure of personal and sensitive data. In addition, to partly address the area of contextual influences on these risks players behaviours were investigated using two adapted scales; Impression Management (Bolino and Turnley, 2003) and Self Determination Theory (Deci and Ryan, 2000).

Chapter 4: An Investigation into the Prevalence and Implications of Online Gaming Addiction and Data Disclosure amongst European and Asian Gamers

This chapter investigates the prevalence and implications of the two most commonly acknowledged and debated risks in online gaming environments; behavioural addiction and disclosure of personal and sensitive data. The chapter begins by considering the theories surrounding the aforementioned risks and continues with an exploration into theories of player behaviour. Consideration is also given to how player behaviour might influence the probability and impact of encountering these risks. The chapter specifically revisits the online gaming addiction, however now with a greater focus on the implications on the Asian as well as European gamers.

Following a discussion of the underpinning theories, the chapter continues with an analysis of two quantitative survey studies; the first exploring the abovementioned risks with EU participants and the second with an Asian demographic. The chapter concludes with a discussion surrounding individual's perception of risk in online gaming environments together with a comparison of cultural similarities and differences.

4.1 Behavioural Addiction, Behaviourism and Reward Cycles

Gaming is by definition a pleasurable activity, however, research suggests that excessive online gaming can in extreme cases lead to symptoms commonly experienced by substance addicts, namely salience, mood modification, craving and tolerance (Wolfing et. al, 2008; Young, 2009; Hsu et al, 2009). Kuss and Griffiths (2012) suggest that particularly excessive engagement with MMORPG's can lead to addiction in a small minority of players.

Thalemann (2009) asserts that adolescents may use online games as a way of coping with stressors and gaming becoming a dysfunctional media-focused coping strategy. However, several significant relationships have been found between problematic gaming and the ways in which adolescents cope with stressors and frustrations (Wolfing et al, 2008). These relationships have indicated certain trends which signal rather negative effects on the behaviour of the gamers. For example, problematic gamers play games significantly more frequently than non-problematic gamers as a reaction to anger and frustration. To this end, it would be reasonable to suggest that they use gaming as a strategy for emotion regulation in order to decrease negative feelings. Thus, a paradox exists as those who play online games excessively are likely to get little chance to actually develop healthy ways of coping with stressors because they are constantly occupied with playing online games (Kuss and Griffiths, 2012). In other words, the frustrations, anger, irritations among these players only become subdued yet expressed in the form of aggression shown in the game, rather than being addressed by other 'healthier' methods. Consequently, their psychosocial development may be significantly impaired. As Wolfling and Muller (2009) point out, whilst the consistent blocking out of and passive coping with stressful experiences may prove a successful strategy in the short term, it may limit the potential to have fundamental experiences that are necessary for developing a protective way to cope in the long term. In these cases, it would appear more likely that once new stressors appear, some individuals (and in particular adolescents) would continue to use escapist and media-focused coping mechanisms, resulting in a vicious circle (Kuss and Griffiths, 2012).

There are a large number of empirical studies that have investigated the negative consequences of stressors upon psychological and physiological parameters when the

aforementioned stressors are not adequately dealt with. Therefore, a selection of coping strategies that are undeveloped may be seen as a risk factor for the development of a variety of negative psychological and psychosomatic problems. These issues are further related to several other adverse physical health related effects. Consequences of developing negative psychological and psychosomatic problems include effects on the immune system (Charlton, 2002), negative affectivity (Kim et al, 2006) and psychosomatic problems (Batthayany et al, 2009). Moreover, Wolfling and Muller (2009) found that some adolescents aged 17-19 who were being treated for online gaming addiction reported suffering from depressive symptoms, anxiety and somatisation. These clinical observations highlight the importance of assessing excessive and potentially pathological online gaming behaviour.

Many scholars have put forward diagnoses of and treatments for behavioural addictions. Indeed, behavioural addictions, such as online gaming addiction have typically been categorised either within the frameworks of impulse control disorders or substance dependencies (Grusser and Thalemann, 2006). Thus far, the criteria developed for the diagnosis of online gaming addiction in empirical studies has been based on either the criteria for pathological gambling or the criteria for substance dependence. It is worth noting that at the time of writing, the American Psychiatric Association, Diagnostic Statistical Manual (APA DSM-IV, 2013) included 'Internet Gaming Disorder' in Section III, listing it as a condition warranting more clinical research and experience before it might be considered for inclusion in the main book as a formal disorder.

According to the APA's official diagnosis (APA DSM-IV, 2013), pathological gambling is defined as an impulse control disorder not otherwise specified (Table 4). Furthermore, the main

characteristic of impulse control disorders is the "failure to resist an impulse, drive, or

temptation to perform an act that is harmful to the person or to others" (APA DSM-IV, 2013.

A.	Persistent and recurrent maladaptive gambling behavior as indicated by five (or more) of the following:
(1)	is preoccupied with gambling (e.g., preoccupied with reliving past gambling experiences, handicapping or planning the next venture, or thinking of ways to get money with which to gamble)
(2)	needs to gamble with increasing amounts of money in order to achieve the desired excitement
(3)	has repeated unsuccessful efforts to control, cut back, or stop gambling
(4)	is restless or irritable when attempting to cut down or stop gambling
(5)	gambles as a way of escaping from problems or of relieving a dysphoric mood (e.g., feelings of helplessness, guilt, anxiety, depression)
(6)	after losing money gambling, often returns another day to get even ("chasing" one's losses)
(7)	lies to family members, therapist, or others to conceal the extent of involvement with gambling
(8)	has committed illegal acts such as forgery, fraud, theft, or embezzlement to finance gambling
(9)	has jeopardized or lost a significant relationship, job, or educational or career opportunity because of gambling
(10)	relies on others to provide money to relieve a desperate financial situation caused by gambling
B.	The gambling behavior is not better accounted for by a Manic Episode.

Table 4 - Diagnostic Criteria for 312.31 Pathological Gambling

Alternative approaches to the assessment of online gaming addiction utilise the official criteria for substance dependence or the dependence syndrome (WHO, 1992; APA, 2000). The features of substance dependence are described as "a cluster of cognitive, behavioural, and physiological symptoms indicating that the individual continues use of the substance despite significant substance related problems" (APA, 2000). Table 5 presents the diagnostic items for substance dependence.

A maladaptive pattern of substance use, leading to clinically significant impairment or distress, as manifested by three (or more) of the following, occurring at any time in the same 12-month period:

(1) tolerance, as defined by either of the following:

    (a) a need for markedly increased amounts of the substance to achieve intoxication or desired effect

    (b) markedly diminished effect with continued use of the same amount of the substance

(2) withdrawal, as manifested by either of the following:

    (a) the characteristic withdrawal syndrome for the (respective) substance

    (b) the same (or a closely related) substance is taken to relieve or avoid withdrawal symptoms

(3) the substance is often taken in larger amounts or over a longer period than was intended

(4) there is a persistent desire or unsuccessful efforts to cut down or control substance use

(5) a great deal of time is spent in activities necessary to obtain the substance (e.g., visiting multiple doctors or driving long distances), use the substance (e.g., chain-smoking), or recover from its effects

(6) important social, occupational, or recreational activities are given up or reduced because of substance use

(7) the substance use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance (e.g., current cocaine use despite recognition of cocaine-induced depression, or continued drinking despite recognition that an ulcer was made worse by alcohol consumption)

Table 5 - Criteria for Substance Dependence

The critical difference between the diagnosis for pathological gambling and substance dependence is that the latter requires the presence of the respective criteria within a 12 month period. Therefore, an addition criterion of 'time' is added to the diagnosis framework and is relevant for the identification of genuine pathology. Moreover, in the case of pathological gambling, the absence of the withdrawal criterion distinguishes the diagnostic criteria from substance dependence. Therefore, for pathological gambling, the actual activity of engaging in the potentially maladaptive behaviour takes a prime role over any other

possible negative consequences the engagement may result in (Kuss and Griffiths, 2012). To

this end, many empirical studies (Barrhyany and Pritz, 2009; Grusser and Thalemann, 2006)

that classify behavioural addiction typically rely on the substance dependence criteria.

Behavioural addictions, such as online gaming addiction, do not involve the ingestion of

psychotropic or psychoactive substances. Instead, any psychotropic effect is the result of

biochemical changes in the body which are triggered by rewarding activities that are then

engaged in excessively (Holden, 2001).

Kuss and Griffiths (2012) conducted a thorough review of classification frameworks for online

gaming addiction. The authors asserted that given the plethora of classifications frameworks,

there was a corresponding need to evaluate each one individually. Inclusion criteria for

evaluation included the following:

i. The inclusion of empirically collected data

ii. An assessment of online gaming addiction in some form

iii. The inclusion of children and adolescents (aged between 8 and 18 years) in the sample

iv. Publication in peer-reviewed journals

v. Full text availability

vi. Publication after the year 2000 and;

vii. Written in either English or German (since these were the authors main languages)

The timeframe for publication (i.e. after 2000) was included (iv.) as it was assumed that

studies published before 2000 had a focus different from online games (MMORPGs). Indeed,

the vast majority of studies published before 2000 typically focused on console or arcade

games without an equivalent on the Internet). The literature search carried out by Kuss and Griffiths (2012) found a total of 30 empirical studies that met the aforementioned inclusion criteria. The 30 empirical studies assessed online gaming addiction using different classification schemes, including criteria for pathological gambling (n = 18), criteria based on substance dependence (n = 3), criteria based on a combination of both pathological gambling and substance dependence (n = 3), those based on parental referral (n = 2), and those based on other miscellaneous classification criteria (n = 4). The themes discussed below primarily present a reflection of the analysis conducted by Griffiths (2012) focused on the usage of various scales and criteria available for evaluating the online gaming addiction.

Online gaming addiction based on the criteria for pathological gambling

As demonstrated in the foregoing sections, pathological gambling encompasses almost identical behavioural symptoms as online gamers. Of the 30 identified research papers, 18 studies assessed online gaming addiction by using adapted diagnostic criteria for pathological gambling and impulse control disorders not otherwise specified (Chan and Rabinowitz, 2006; Rau et al., 2006; Wan and Chiou, 2006, 2007; Han et al., 2007; Gentile, 2009; Han et al., 2009; Lemmens et al., 2009, 2011a, 2011b; Thomas and Martin, 2010; van Rooij et al., 2010; Dongdong et al., 2011; Gentile et al., 2011; Kwon et al., 2011; van Rooij et al., 2011). In 6 studies (Chan and Rabinowitz, 2006; Rau et al., 2006; Han et al., 2007; Han et al., 2009; Thomas and Martin, 2010; Kwon et al., 2011), online gaming addiction was assessed using an adapted version of Young's (1998) Internet Addiction Scale (IAS) (Young, 1996a, 1996b, 1998; Widyanto and McMurran, 2004).

The IAS assesses the following addiction components: salience, excessive use, neglecting work, anticipation, lack of control and neglecting social life, some of which were discussed under Section 3.7.2.4. The scale was found to have good internal consistency, reliability and validity (Widyanto and McMurran, 2004).   In three studies, pathological gaming was measured by the use of the Game Addiction Scale (GAS) for Adolescents (Lemmens et al., 2009, 2011a, 2011b). The scale was found to have good concurrent, convergent and criterion validity, and measured the following addiction symptoms: salience, tolerance, mood modification, relapse, withdrawal, conflict and problems (Lemmen et. al. 2009).

In three studies (Gentile, 2009; Choo et al, 2010; Gentile et al, 2011), pathological gaming was assessed using the Pathological Video Game Use Scale developed by Gentile (2009). The scale uses the DSM-IV-TR criteria for pathological gambling and diagnoses addiction when at least five out of ten symptoms are met. Furthermore, in another study by Dongdong et al, (2011), the Pathological Video Gaming Scale (Choo et al, 2010) was used. This scale is another measure utilising the official DSM-IV criteria for pathological gambling and includes ten items. Two studies have used the Compulsive Internet Use Scale (Meerkerk et al, 2009) to assess online gaming addiction (van Rooij et al, 2010; van Rooij et al, 2011). The scale measures symptoms that relate particularly to the compulsive and impulse control elements of the behaviour, including loss of control, preoccupation, conflict, withdrawal symptoms and coping. The scale devised by Meerkerk et al (2009) was found to have good internal consistency, construct and discriminatory validity (Lin and Tsai, 1999).   It measures compulsive use and withdrawal, tolerance, related problems of family, school, and health, and related problems of peer interaction and finance. The scale was found to have good internal consistency, construct and discriminatory validity (Lin and Tsai, 1999).

Online gaming addiction based on the criteria for substance dependence

Three studies were identified by Griffiths and Kuss (2012) that adapted the official criteria for substance dependence in order to classify online gaming addiction (Grusser et al, 2005; Batthyany et al 2009; Rehbein et al, 2010). The basis of assessment was the official criteria for substance dependence and the dependence syndrome as based on the international classification manuals (APA, 2000; WHO, 1992). In two of the studies (Grusser et al, 2005; Batthyany et al 2009) excessive computer game play was diagnosed using the Assessment of Computer Game Addiction in Children – Revised (Fragebogen zum Computerspielverhalten bei Kindern, CSVK-R; Thalemann et al., 2004). Using this assessment tool, computer game play is classified as pathological when children and adolescents score a minimum of 7 out of 27 points on the scale. Furthermore, the psychometric qualities of this scale were validated by Thalemann et al. (2004). Rehbein and Borchers (2009) developed the Video Game Dependency Scale to diagnose video game dependency. Similarly to the scale developed by Lin and Tsai (1999), the Video Game Dependency Scale was adapted from the Internet Addiction Scale (Hahn and Jerusalem, 2001); all of which are self-devised measurement instruments and not identical to Young's Internet Addiction Test (1998). The scale was found to have good discriminatory power and assessed the following addiction criteria: preoccupation and salience, conflict, loss of control, withdrawal symptoms, and tolerance (Rehbein and Borchers, 2009).

Online gaming addiction based on the criteria for both pathological gambling and substance dependence

Three studies (Salguero and Moran, 2002; Skoric et al., 2009; Bear et al., 2011) used a classification framework based on self-devised scales combining both pathological gambling and substance dependence adapted criteria in order to diagnose potentially addictive online gaming behaviour. Salguero and Moran (2002) developed a 9-item scale that was cross validated with results from the Severity of Dependence Scale (Gossop et al., 1995) and used a sample of 223 Spanish adolescents aged between 13-18 years. The authors reported that their Problematic Video Game Playing Scale measured a uni-dimensional construct and had an acceptable internal consistency and good construct validity. Furthermore, they concluded that problematic video game play is similar to the dependence syndrome (Salguero and Moran, 2002).

Skortic et al. (2009) developed a scale based on the American Psychiatric Association's criteria for pathological gambling and substance dependence (2000) as well as Danforth's classification of online game addiction (2003). Specific criteria included behavioural salience, conflict, withdrawal symptoms (based on Brown, 1991, 1993) as well as further unspecified DSM-IV symptoms (Skoric et al. 2009). The authors used a sample of 333 elementary school video gamers from Singapore aged 8-12 years. The findings indicated that online gaming addiction correlated negatively with performance in school. However, they found that neither time spent playing games nor the engagement in games correlated with poor school performance (Skoric et al. 2009).

Bear et al. (2011) devised a scale that investigated both adolescents and parental reports. The scale is based on the criteria for Internet addiction for adolescents as proposed by Ko et

al. (2005) and includes the criteria for impulse control and substance abuse disorders. The items that specifically assess addiction criteria include:

i. A preoccupation with computer/gaming-station activities

ii. A failure to resist the impulse to use

iii. Tolerance

iv. Withdrawal

v. Longer than intended use

vi. Unsuccessful efforts to cut down

vii. Excessive efforts put into trying to use, and

viii. Continued use despite the knowledge that it causes problems

The Computer/Gaming-station Addiction Scale devised by Bear et al. (2011) investigates the aforementioned criteria on a continuum with addiction scores ranging from 8 to 40 points. To assess the patterns of computer and gaming-station use in adolescents, the authors surveyed 102 youths aged between 11 and 17 years in addition to their parents. The results indicated that the addiction score significantly correlated with functional impairments across multiple life domains, namely family, learning, life skills, self-concept, and social activity (Bear et. al., 2011).

Online gaming addiction based on parental reports

Two studies (Cultara and Har-El, 2002; Allison et. al., 2006) assessed the psychopathological status of two male adolescents addicted to online gaming based on their parents' qualitative reports. Allison et al (2006) reported the case of an 18 year old male adolescent whose life,

according to his parents, had been taken over by playing online role-playing games for up to 16 hours daily. The adolescent was admitted into psychiatric hospital by his parents where he underwent a variety of psychological and psychiatric assessments for three days, including an intelligence test, a personality test, and diagnostic and psychosocially based interviews (Kuss and Griffiths, 2012). His primary motivation for gaming was reported to be escape from real life problems. The authors reported that his gaming resulted in a variety of psychosocial (limited real life social contacts, missing classes at school), psychosomatic (poor concentration, muscle tension), and psychopathological problems (diminished energy, fatigue) (Allison et. al., 2006). Furthermore, Griffiths (2010) reported similar results in case studies of adult gamers.

Cultara and Har-El (2002) reported the case of a 17 year old adolescent who, during video game play, continuously moved his lower jaw up and down, repeatedly grimaced and swallowed and protruded and retruded his tongue. These symptoms resulted in muscle hyperthrophy that was found to be secondary to the actual activity of his excessive game playing. Indeed, according to the authors, once the adolescent ceased playing video games, the submental mass that he had developed decreased in size.

The above studies provide a qualitative contextual insight into how adolescents experience online gaming addiction as well as certain associated symptoms. Such in-depth insights provide both an elaborate description of individual experience and aids scholarly research by illustrating the consequences of online gaming addiction to adolescents. In addition, the studies highlight that for many children and adolescents, it is their parents that initially realise that their children's online gaming extends beyond enjoyment of playing and can in fact be

problematic. To this end, a recent study by Beutel et al. (2011) found that of the total number of adolescents referred to the Outpatient Clinic for Gaming Addiction in Mainz, Germany; 86% of the referrals were initiated by the parents of potentially addicted adolescents. Beutel at al. (2011) study also points towards the significance of social support for adolescents because, firstly, they find themselves in critical periods of cognitive, behavioural and social development during these developmental periods, and secondly, they cannot overcome their problems by themselves and are thus in need of both social and professional assistance. However, Kuss and Griffiths (2012) assert that a professional evaluation of the situation and the adolescents' addiction status is a crucial second step that may potentially lead to clinical treatment of online gaming addiction.

Online gaming addiction based on other miscellaneous classification criteria

Four studies (Chiu et al., 2004; Ko et al., 2005; King and Delfabbro, 2009; Kim and Kim, 2010) were identified as using miscellaneous criteria that did not fit into any of the abovementioned frameworks. Chiu et al. (2004) aimed to address video game addiction in 1,228 children and adolescents, grades 5-8 in Taiwan. The authors used a self-devised Game Addiction Scale (based on Buchman and Funk, 1996; Clymo, 1996) comprising a 9-item scale that assesses two factors, namely game addiction and game concern. There was, however, no clear definition of their term "video game addiction" or what kinds of symptoms were included. The authors found that video game addiction correlated negatively with academic achievement and positively with hostility. In addition, lower function, higher sensation seeking and higher boredom inclination predicted game addiction. Surprisingly, the authors found that female gender predicted game addiction (Chiu et al., 2004).

Kim and Kim (2010) devised the Problematic Online Game Use Scale (based on Young, 1999; Armstrong et al., 2000; Caplan, 2002; Lee and Ahn, 2002; Charlton and Danforth, 2007) that assessed the following criteria: euphoria, health problem, conflict, failure of self-control, and preference for virtual relationships. The authors aimed to measure problematic online game use and to test the external validity of the scale by having three independent samples of 5th, 8th and 11th graders in South Korea (n = 2,014). They reported that their scale had good reliability, as well as convergent and discriminatory validity. Furthermore, problematic online game use was found to be negatively correlated with academic self-efficacy and satisfaction with daily life and positively correlated with anxiety and loneliness (Kim and Kim, 2010).

King and Delfabbro (2009) investigated the psychological and social context of video game playing in order to understand excessive video game play using pilot group interviews with a sample of 23 adolescents (mean age = 16 years, SD = 1 year) and 15 adults. Their results indicated that online role-playing games were more rewarding and consequently more addictive than causal games. Video game playing was defined as excessive when it "created adverse personal and social consequences in a person's life". The study found that excessive video game players experienced a variety of problems such as conflicts with important life responsibilities, they neglected their social relationships, scholastic and professional productivity suffered, they ignored their household duties and they had irregular sleeping patterns (King and Delfabbro, 2009).

Ko et al. (2005) assessed gender differences and related factors affecting online gaming addiction amongst 221 Taiwanese adolescents aged 13 to 15 years (mean age = 13.8 years,

SD = 0.7 years). They used the Chinese Internet Addiction Scale (Chen et al., 2003); a continuous measure that includes 26 items to assess five dimensions of problems related to Internet use, adapted to measure online gaming experiences exclusively. Their study investigated the following Internet related problems, namely, compulsive use, withdrawal, tolerance, interpersonal relationships, health and time management. The findings indicate that males are significantly more likely to be addicted to playing online games. Furthermore, in the case of males, several factors predicted online gaming addiction, namely older age, lower self-esteem, and lower daily life satisfaction (Ko et al., 2005).

In light of the fact that the aforementioned studies used miscellaneous classification frameworks, they are evaluated in turn. Chiu et al.'s (2004) study suffered from a variety of methodological and conceptual problems, such as the omission of defining video game addiction. Moreover, their findings which asserted that females were more likely to have a videogame addiction appear questionable as numerous studies indicate the opposite (e.g. Rehbein and Borchers, 2009); thus suggesting that the measure used lacked sensitivity and specificity. Kuss and Griffiths (2012) assert that being a female could likely be a better predictor of certain aspects of addiction because it is less commonly associated with addiction.

Kim and Kim's (2010) study relied on game imminent factors. Indeed their scale was designed to specifically assess online gaming addiction, such as a preference for virtual relationships. Although their scale was validated in different samples, its utility as a clinical assessment tool to clearly demarcate online gaming addiction from mere engagement (Charlton, 2002) has not been established. Moreover, Kuss and Griffiths (2012) point out that with regard to the

symptoms it assesses, the use of euphoria as an addiction symptom is questionable from a conceptual perspective. To this end, Griffiths (2002) asserts that healthy enthusiasm adds to life whereas addiction takes away from it, thereby suggesting that euphoria does not necessarily have to feature within an addition framework, as suggested by Charlton and Danforth (2007). Although Kim and Kim's study (2010) assumes online game addiction as being entirely based on the virtual world, the respective criteria used for classifying online gaming addiction could indeed prove less useful in a clinical context (Kuss and Griffiths, 2012).

King and Delfabbro's study (2009) indicated that adolescents that play online games excessively experience a variety of problems because of their game play. Nevertheless, no validated measurement tool was utilised to actually validate the participants' addiction status. Therefore, it appears relatively problematic to deduce implications for online gaming addiction and mental health status in adolescents from their study.

In the study by Ko et al., (2005) the authors did not use an assessment instrument that was based on established diagnostic criteria. Their measurement instrument is only vaguely based on substance dependence as it used criteria such as tolerance and withdrawal. Therefore, it is unclear on what basis the other criteria have been chosen and how online gaming addiction has been defined. Indeed, no cut off values were provided, and as such, clinical diagnosis is not possible.

This review provides an insight into the state of current knowledge of online gaming addiction. The abovementioned empirical studies illustrate that different classification schemes have been adopted, most of which are based on the official criteria for pathological

gambling, substance dependence, or a combination of both. From the sample of studies, it is clear that the majority adapted pathological gambling criteria in order to assess the extent to which online gaming addiction is present in samples of children and adolescents. This method is acceptable since online gambling and online gaming share a plethora of similar characteristics that have been extensively discussed in psychological literature for circa 20 years (Johansson and Gotestam, 2004; Griffiths, 2005). Moreover, according to Kuss and Griffiths (2011) there is now a number of overviews highlighting the convergence between Internet, gaming and gambling (e.g. Griffiths, 2002; King, Delfabbro and Griffiths, 2010). This in turn suggests that the (potentially pathogenetic) gaming and gambling activities are progressively converging. However, although gaming and gambling share a variety of similarities, they cannot be necessarily equated with one another.

One of the major similarities between online gaming and gambling is the use of operant conditioning. Operant conditioning was originally coined by Skinner (1938) and refers to the changing of behaviour through the use of reinforcement which is given after the desired response. Three types of responses or operant were identified that can follow behaviour:

- **Neutral Operants:** responses from the environment that neither increase nor decrease the probability of a behaviour being repeated.

- **Reinforcers:** responses from the environment that increase the probability of a behaviour being repeated. Reinforcers can be either positive or negative.

- **Punishers:** responses from the environment that decrease the likelihood of a behaviour being repeated. Punishment weakens behaviour.

In addition, Skinner's (1938) study with rats found five prominent reinforcement "schedules":

- **Continuous Reinforcement:** the rat was rewarded with food each time it pressed a bar.

- **Fixed Ratio:** the rat could be rewarded with food every 'nth' amount of time. In World of Warcraft and other role-playing games, a player's character can "level-up", thus gaining power and receiving new abilities. As the player progresses and time elapses, the fixed ration grows larger (often exponentially), thus making the game more challenging and the rewards of "levelling-up" that much greater of a reinforcement.

- **Variable Ratio Schedule:** the rat would be reinforced with food an average of 25% of the times that it pressed the bar, meaning that the number of presses would be variable before each reward is given. In World of Warcraft and other role-playing games, random items are 'delivered' or made available to the player at random intervals, however, as the player progresses through the game the interval between rewards increases exponentially.

- **Fixed Interval:** the rat would be reinforced with food after a certain amount of time, regardless of presses. Many MMORPGs offer achievements and rewards simply for playing for a certain amount of time. The player is reinforced for consistency.

- **Variable Interval:** the rat would be reinforced at a varying amount of time. This reinforcement schedule is commonly used in online role playing games to encourage players to frequently return to the virtual world. For example, a monster holding an epic treasure can appear at

random. Each time a player logs into the game, there is a chance they could have the opportunity to slay a dragon and claim a large reward.

The structural characteristics of Massively Multiplayer Online Role Playing Games (MMORPGs), even at the very basic level, embrace Skinner's (1938) theory of Behaviourism and the schedules of reinforcement described above. MMORPG's are often described as 'Virtual Skinner Boxes' and in most instances use variable (random) ratio reinforcement. Indeed, two of the most popular MMORPGs, Everquest and World of Warcraft use a random interval reinforcement schedule, meaning that players continue to play as they never know when that extra skill point is coming or how many points they will score for a particular battle (King et al. 2010).

Chumbley and Griffiths (2006) investigated players' affective responses and willingness to continue to play as a function of negative reinforcement in a video game. Negative reinforcement was operationally defined in terms of the difficulty of the game. The researchers reported no significant relationship between player excitement and type of reinforcement (high or low difficulty). However, the low negative reinforcement group reported a higher degree of willingness to continue playing the video game than the high negative reinforcement group. This study suggested that, on a basic level, players are generally more motivated to play a video game that offers frequent rewards and fewer obstacles. On a similar theme, Chen et al (2008) examined how game feature change through expansions and patches can affect the social interaction within Massively Multiplayer Online Role Playing Games. The authors' in-depth interviews uncovered that changes in World of

Warcraft affected in-game social interaction in three places, namely; interpersonal relationships, community size and social alienation.

The reward delivery systems embedded into the structural characteristics of MMORPGs can be directly linked to online gaming addiction. Indeed, as King et al (2010) assert, by understanding the structural features in video games that promote excessive playing behaviour, psychologists may be better equipped to manage clients with technology-based problem behaviours. To this end, it could also prove beneficial for players to be educated about particularly risky video game features in order to minimise the risk of playing certain video games to excess.

4.1.1 Impression Management

Social interaction in MMORPGs is viewed as one of the most important factors of why gamers continue to play and engage in these environments for excessive periods of time. Cole and Griffiths (2007) found that MMORPGs were highly social interactive arenas providing the opportunity to create strong social friendships and emotional relationships. Furthermore, it was also claimed that social interactions in online gaming formed a considerable element in the enjoyment of playing.

Massively Multiplayer Online Role Playing Games, as with other online contexts, enable players to consciously construct an online representation of self in the form of an avatar. Central to the conception of online representation is impression management. Impression management is the process through which people try to control the impressions other people form of them. It is usually synonymous with self-presentation and is a goal directed conscious

or unconscious attempt to influence the perceptions of other people about a person, object, or event by regulating and controlling information in social interaction (Piwinger and Ebert, 2001).

Jones and Pittman (1982) developed a taxonomy of impression management behaviours that are set out and described below:

- **Self-Promotion:** pointing out ones abilities or accomplishments in order to be seen as competent by observers.

- **Ingratiation:** use flattery or do favours to elicit an attribution of likability from observers.

- **Exemplification:** self-sacrifice or go above and beyond the call of duty in order to gain the attribution of dedication from observers.

- **Intimidation:** signalling of power or potential to punish in order to be seen as dangerous by observers.

- **Supplication:** advertisement of weaknesses or short comings in order to elicit an attribution of being needy from observers.

Impression management and self-presentation in MMORPG environments is commonplace (Orsatti and Riemer, 2012; Park and Chung, 2011). Indeed, Park and Chung's study (2011) found that self-presentation desire caused trust of online games and led to stronger

commitments to gamers. Thus, it could be reasonably asserted that greater social ties and stronger commitment from gamers could lead to greater time spent playing online games.

Typically impression management is measured using one of two approaches. The first approach involves observing and recording participant's impression management behaviours in an experimental context or under naturally occurring conditions (e.g. Fandt and Ferris, 1990). The strength of this approach is focus and objectivity; thus specific impression management tactics can be observed and their unique effects explored. Moreover, as impression management behaviours are not self-reported, social desirability bias is not problematic. However, the main limitation of this approach is that most studies that embrace this method are conducted in laboratory settings and as such their generalizability to other settings (e.g. organisational) is often questionable. To this end, the ability to gain access to certain settings (e.g. organisational) is often a formidable task.

The second approach taken by researchers attempting to measure impression management has generally involved the use of an impression management scale. Two measurement scales developed by Wayne and Ferris (1990) and Kumar and Beyerlein (1991) attempted to measure impression management, however, several limitations were identified by Bolino and Turnley (1999). Indeed, one of the most widely adopted instruments for measuring impression management is the 22-item impression management scale developed by Bolino and Turnley (1999). This scale was developed to measure the five dimensions of the Jones and Pittman (1982) taxonomy and has been rigorously tested for both convergent and discriminant validity.

In summary, impression management is deemed central to social interactions in online gaming, thus making it worthy of future research.

4.3 Self Determination Theory (Basic Psychological Needs Satisfaction)

It is commonly acknowledged that people are centrally concerned with motivation and how to move themselves or others to act. Indeed, people are often moved by external factors such as reward systems, grades, evaluations, or the opinions they fear others might have of them (Deci and Ryan, 2000). Self Determination Theory (SDT) represents a broad framework for the study of human motivation and personality. SDT is in essence a meta-theory for framing motivational studies, a formal theory that defines intrinsic and varied extrinsic sources of motivation, and a description of the respective roles of intrinsic and types of extrinsic motivation in cognitive and social development and in individual differences.

According to Deci and Ryan's (2000b) SDT theory, the following fundamental needs must be continually satisfied for an individual to develop and function in a healthy and optimal way:

- **Autonomy:** the condition of being autonomous; self-government, or the right of self-government; independence.

- **Relatedness:** the association or connection to others.

- **Competence:** possession or required skill, knowledge, qualification, or capacity; of sufficient quality.

The aforementioned supporting conditions are argued to foster the most volitional and high quality forms of motivation and engagement for activities, including enhanced performance, persistence, and creativity. In addition SDT proposes that the degree to which any of these three psychological needs is unsupported or thwarted within a social context will have a robust detrimental impact on wellness in that setting. To this end, according to Deci and Ryan (2000), the darker sides of human behaviour and experience, such as certain types of psychopathology, prejudice, and aggression are understood in terms of reactions to basic needs having been thwarted, either developmentally or proximally. Therefore, when attempting to classify the pre-cursors for psychopathological behaviour such as online gaming addiction, Self Determination Theory could be a valuable instrument.

Self Determination Theory formally comprises of five mini-theories, each of which was developed to explain a set of motivationally based phenomena that emerged from laboratory and field research. Each theory addresses one facet of motivation or personality functioning. These are described in turn below (Vansteenkiste et al., 2013):

- **Cognitive Evaluation Theory (CET):** concerns intrinsic motivation, motivation that is based on the satisfactions of behaving for "its own sake". Examples of intrinsic motivation are children's exploration of play. CET specifically addresses the effects of social contexts on intrinsic motivation and interest. CET highlights the critical roles played by competence and autonomy supports in fostering intrinsic motivation, which is crucial in education, arts, sport, and many other domains.

- **Organismic Integration Theory (OIT):** addresses the topic of extrinsic motivation in its various forms, with their properties, determinants, and consequences. Broadly speaking, extrinsic motivation is behaviour that is instrumental; that aims toward outcomes extrinsic to the behaviour itself. There are, however, distinct forms of instrumental behaviour, including external regulation, introjection, identification and integration. These subtypes of extrinsic motivation are seen as falling along a continuum of internalisation. Indeed, the more internalised the extrinsic motivation, the more autonomous the person will be enacting the behaviours. OIT is further concerned with the social contexts that enhance or forestall internalisation.

- **Causality Orientations Theory (COT):** describes individual differences in people's tendencies to orient toward environments and regulate behaviour in various ways. COT describes and assesses three types of causality orientations, namely:

  - *Autonomy orientation*: in which persons act out of interest in and valuing of what is occurring
  - *Control orientation*: in which the focus is on the rewards, gains, and approval and;
  - *Impersonal or amotivated orientation*: characterised by anxiety concerning competence.

- **Basic Psychological Needs [Satisfaction] Theory (BPNT):** elaborates the concept of evolved psychological needs and their relations to psychological health and well-being. BPNT argues that psychological well-being. BPNT argues that psychological

well-being and optimal functioning is predicted on autonomy, competence, and relatedness. Therefore, contexts that support versus thwart these needs should invariantly impact wellness. The theory argues that all three needs are essential and that if any is thwarted there will be distinct functional costs. Because basic needs are universal aspects of functioning, BPNT looks at cross-developmental and cross-cultural settings for validation and refinements.

- **Goal Contents Theory (GCT):** grows out of the distinctions between intrinsic and extrinsic goals and their impact on motivation and wellness. Goals are perceived as differentially affording basic need satisfactions and are thus differentially associated with well-being. Extrinsic goals such as financial success, appearance, and popularity/fame have been specifically contrasted with intrinsic goals such as community, close relationships, and personal growth, with the former more likely associated with lower wellness and greater ill-being.

Investigating the degree to which online gaming fulfils an individual's fundamental needs of autonomy, relatedness and competence could help to understand motivations of engagement and psychopathological behaviour. Wu, Lei and Ku (2013) hypothesised that the three aforementioned basic psychological needs are positively associated with purpose in life, which in turn acts as a protective factor against problematic video game play amongst young Chinese adult gamers. Their survey study ($n = 165$, 18-30 years, mean age = 22.7 years) found that perceived autonomy, competence, relatedness and purpose in life were all negatively correlated with problematic video game play. More specifically, gender, perceived relatedness and purpose in life emerged as the three most salient predictors of problematic

game playing amongst the surveyed demographic. Moreover, the mediating role of purpose in life was evidenced and it was found that purposed in life mediated the influences of the psychological needs proposed by SDT on problematic game play. In addition, young males were found to be significantly more susceptible to problematic game play than their female counterparts. In summary, the authors found that psychological needs and purpose in life influenced Chinese young adults' vulnerability to problematic game playing directly or indirectly.

For many gamers, playing out their alternative 'virtual' lives (otherwise known as "alter ego") within the Massively Multiplayer Online Role Playing Game environment is preferred to living and immersing in the real life environment (Sandford, 2005), thus suggesting that MMORPG's satisfy, to a greater or lesser degree, the fundamental needs of autonomy, relatedness and competence. To this end, SDT would be a useful instrument to further understand the area of online gaming addiction.

4.7 Privacy and Disclosure of Personal and Sensitive Data

It is widely accepted that the disclosure of personal and sensitive data can increase an individual's propensity to risk and consequential harm (e.g. grooming, fraud, compromised accounts and cyber-attacks). Indeed, MMORPG's are highly social arenas with players forging strong social ties with one another. Harm as a result of data disclosure within online gaming environments has previously been reported; for example, in 2009, a primary school teacher was convicted of grooming a child on World of Warcraft after befriending the teenager in the interactive online game world in order obtain his mobile phone number (Daily Mail, 2009).

More recently, the disclosure of data in Massively Multiplayer Online Role Playing Games has attracted attention from various national security agencies. According to a report from the BBC (2013), the National Security Agency, USA and Government Communications Headquarters, UK, have infiltrated online games such as World of Warcraft in order to monitor communications between players for the purpose of anti-terrorism. This illustrates that significant amounts of personal and sensitive data are disclosed within these environments on a regular basis.

Despite the plethora of awareness raising literature (Get Safe Online, 2013; Cybersmart, 2014) warning children and adolescents about the dangers of disclosing personal information online, it has been found that the players continue to publically divulge data increasing their propensity to harm. The structural characteristics of MMORPG environments, through team collaboration opportunities, promote the forging of strong social ties between players (Wu and Liu, 2007). To this end, research suggests that higher levels of trust are associated with greater amounts of self-disclosure (Wheeless and Grotz, 1977; Pistole, 1993).

4.8 An Investigation into Addiction and Data Disclosure in Massively Multiplayer Online Role Playing Games

The literature thus far presents an argument for investigating behavioural addiction and data disclosure in online gaming environments. Two survey studies were undertaken amongst both European and Asian demographics. The aim of these studies were to:

1. Explore the factors that contribute and are associated with online gaming addiction

2. Investigate the hypothesis that online gaming addiction could lead to greater levels of personal and sensitive data disclosure

3. Identify any cultural influences between European and Asian gamers

4.8.1 Methodology – European Survey

The first survey assessed the perceived levels of online addiction amongst European MMORPG gamers and their abilities to detect and respond to potential exploitation attempts. In addition, questions related to lifestyle and social implications and emotional investment were posed in order to provide insight into wider contextual issues. Hammersley (1987) proposes that quantitative measurement is most often addressed by means of well-established concepts of validity and reliability. With this in mind the study used well-established, reliable and valid constructs.

Participants were recruited through collaboration with leading MMORPG Company Blizzard-Activision. Invitations to participate in the study were posted into online gaming forums which contained a link to the survey study. A total of 357 European gamers were surveyed.

In addition to the quantitative approached outlined above, participants were invited to provide more qualitative data on their personal experiences in online gaming environments, thereby gathering a subjective in-depth insight into their feelings, experiences and motivations of behaviour which would not necessarily be captured by objective quantitative approach (Lobe el al., 2007). To this end, the mixed method approach provided both breadth of coverage and depth of understanding. Participants were invited to provide their contact

details at the end of the study if they wished to participate in the second phase which constituted a follow-up semi-structured telephone interview.

Certain limitations are noted. Firstly, the sample being limited to only the gamers who filled in the survey, the findings of such a survey cannot be generalised for the whole European population. Thereby, indicating that the tests conducted apply only to the respondents who were sampled or completed the survey. Furthermore, in contrast to the dominant perception of most statisticians who apply the chi-square test as the most robust test for a non-random sample, the present research goes against this conception.

The survey was split into the following sections:

- **Demographic**

  Including age, gender and amount of time spent playing online games.

- **Addiction**

  The study used the Game Addiction Scale (GAS) developed by Lemmens et al. (2009) as this scale has been used extensively in similar game addiction studies and has good reliability and validity. In order to determine the levels of addiction amongst MMORPG subscribers, 26 questions were compiled; each of which were benchmarked against Griffiths' (1998) behavioral addiction framework (salience, mood modification, withdrawal symptoms, relapse, tolerance and conflict). Griffiths (1998) states that for an individual to be classed as behaviorally addicted they must show signs of each of the six criteria.

- **Social Impact**

  Based on literature and self-disclosed reports from online gamers, questions were compiled to gain an insight into the social implications of playing online games, including; negative/positive impacts on real world social life, preferred methods of communications with others, strength of social ties with other players and discussion of personal issues with other players.

- **Lifestyle Impact**

  Based on current literature, questions were compiled to gain an insight into the lifestyle implications of playing online games, including; neglect for real life responsibilities, time spent online and healthy and optimal living.

- **Potential for Harm and Privacy Risks**

  This section posed questions relating to disclosure of personal and sensitive information and the corresponding potential for harm. Based on reported risks in online environments factors assessed included types of data previously disclosed in online gaming environments (i.e. age, location and email addresses), approaches for personal pictures and face-to-face meetings, divulging of account credentials and personal contact information. In addition, questions surrounding suspicious behaviour of others were included in order to part assess participants' perception of risk.

The second phase of the study used semi-structured telephone interviews with willing participants who were classified as behaviourally addicted. This phase sought to gather

163

further information on participants' addiction, motivations, impact on lifestyle and threats to personal privacy. Furthermore, participants' were questioned about their experience of meeting online based gaming friends in person.

4.8.2 Results – European Survey

Demographic

Most of the respondents were male (86%) with almost half (48%) aged between 18 and 21. The vast majority (87%) played their online game on a daily basis with 41% playing for more than 5 hours per weekday and 24% spent 9 hours or more engaging in the game over a given weekend.

Addiction and Addictive Tendencies

Participants were asked to reflect on their playing habits and if they classified themselves as addicted to gaming. Of the total surveyed population 20% openly admitted to being addicted to MMORPG's of which 17% felt that they could not give up playing on their own. This correlated with 23% of participants that were classed as behaviorally addicted in accordance with Griffiths' (1998) six point criteria framework. Although only a quarter of the total respondents were classed as behaviorally addicted, the following statistics indicated that many of the surveyed players were experiencing negative lifestyle changes as a result of their engagement with MMORPG environments.

- 29% attempted to cut down the amount of time they spend on MMORPG's but were unsuccessful.

- 63% found themselves spending increasing amounts of time online.

- 85% frequently found themselves staying up until late into the evening playing MMORPG's.

- 80% often found themselves thinking about the game when they were not physically playing.

Lifestyle Impact

Participants were asked to reflect on the impact of their gaming on their lifestyle. The findings are highlighted below:

- 22% felt the number of hours spent online was unhealthy

- 35% considered their MMORPG engagement as a top priority in their life.

- 22% consequently missed or had been late for appointments or work due to playing MMORPG's.

- 42% missed meals as a result of online gaming.

Social Implications

In this section, participants were asked to reflect on the perceived social implications of their gaming. The results are presented below:

- 84% believed that their online gaming habit had a negative effect on their real world social life.

- 53% preferred to socialise within MMORPG environments than with real world offline friends.

- 52% found playing an MMORPG more exciting than going out with friends.

- 51% found interacting with online friends easier than conversing with real world friends.

- 80% had formed particularly close friendships with other MMORPG players.

- 96% discussed personal issues not related to game play with fellow players.

Potential for Harm and Privacy Risks

This section focused on participant's abilities to perceive and respond to commonly reported risks in online gaming environments. The following responses provided an insight into participant's attitudes towards privacy and risk.

- 86% had been asked to disclose personal and sensitive data in MMORPG environments, including age (76%), location (75%) and email addresses (50%).

- 41% had received requests for personal pictures. 57% had been asked by online based friends to meet face-to-face. 10% were previously asked to divulge account details including passwords.

- 89% had previously divulged personal and sensitive data in an MMORPG environment, including age (81%), location (77%), and email addresses (48%).

- 38% sent personal pictures to online friends upon request

- 22% previously divulged personal telephone numbers.

- 10% had divulged credentials upon request.

In addition, almost half (45%) of the respondents had become suspicious of other players behaviors whilst engaging with MMORPG's. Concerns included stalking, harassment, racism, stealing of online currency and property, and extreme aggressive behavior.

The final stage of the study comprised of a semi-structured telephone interview with willing participants who were classified (according to Griffiths' (2000) framework) as 'behaviorally addicted'. Of the 23% who fell into the aforementioned category, 20% agreed to be interviewed. A total of 16 people were interviewed. The key highlights from the follow-up case studies are detailed below:

- 3 gamers interviewed felt they were addicted to their game and could not live without it.

- 11 stated that the games provided them with a sense of purpose and invoked a feeling of being valued and respected.

- 8 gamers interviewed were either married and/or had their own family. 84% of these admitted that their MMORPG engagement had a negative impact on their family life as a whole and 8% reported that their online gaming had caused family breakup.

- 3 gamers interviewed revealed that they had been subject to one or more social engineering attack. 5% of these fell victim to successful attacks including fraud and being duped into sending personal sexually orientated pictures.

- 6 gamers interviewed had met online based acquaintances in person. 20% of these stated they found the real life personality of the other individual to be much different than their previous online based perception.

4.8.3 Discussion

The results provide a valuable insight into the potential risks faced by online gamers. Indeed, the findings relating to addiction and addictive tendencies provided evidence that gamers felt captivated by the game and in many cases found themselves spending increasing amounts of time engaged in the environment and thinking about the online gaming arena. In comparison, considerably less acknowledged the lifestyle implications of their gaming activities although a significant percentage of surveyed participants admitted to neglecting certain real life responsibilities. These findings are echoed by qualitative feedback from one participant's parent:

"My son who is 15 is the online gamer. I completed this survey (I'm 45) to the best of my knowledge. He has become withdrawn, depressed, his grades have suffered as well as his sleep patterns, social behaviours. I have him in counselling, but he refuses to believe he has a problem. I know that he has an addictive personality and maybe borderline ADHD, because he is just like me. I believe that there is huge populations of teenagers out there just like him who are missing out on so much life because of this addiction."

Turning to the social implications of MMORPG's, the findings reinforced that these arenas are highly sociable with players building a strong sense of trust with online friends. Over half of the surveyed participants found conversing online easier than staging real life conversations, highlighting the shift change in communication brought by technology and specifically online games. One participant's qualitative response highlights the impact of the social structural characteristics of MMORPG's together with the perceived importance that online gaming plays in certain gamers lives:

"I'm a guild master in World of Warcraft. I have many good friends in WoW and we look after and protect each other. My role as guild master is important and my group members respect me and follow my command. I have met many good loyal friends online who I discuss many issues with. I play the game for several hours a day and find it a very positive social experience"
[Male, 18 – 21]

It is commonly acknowledged that the disclosure of personal and sensitive data increases the risk exploitation. Joinson (2003) asserts that online communities are, in many cases, characterised by relatively high levels of trust and this provides the opportunity to deceive, violate and exploit members of such communities (Rheingold, 2003). Donath's (2014) study found that deception commonly occurs in MMORPG environments, making specific reference to gender bending.

The findings clearly highlighted a significant risk of disclosure of personal and sensitive data in online gaming environments with the majority of participants reporting that they have been asked for personal information and over half of the respondents had been asked by online friends to meet in person. Moreover, a large percentage of participants had previously disclosed personal and sensitive data in online gaming environments, highlighting both a lack of individual awareness and the highly trusting arena fostered by the online gaming environments. In addition, the following qualitative responses indicate the feelings, emotions and dependence that some gamers place on MMORPG's:

"Neglecting my wife and kids emotional needs, depression amplified by gaming" [Male, 30-39]

"Well… I can only speak from personal experience. I was addicted to World of Warcraft for over 2 years… I am a recovering online gaming addict. I almost lost my job, family and wife over my obsession. It was all I could think about, it dominated every waking moment of my conscious, (and unconscious at night) mind. After years of emotional neglect, my family had finally had enough." [Male, 21-29]

"There are very lonely people online, (I was probably one of them too). I have had times where other players have acted inappropriately towards me that they perhaps wouldn't have meeting someone in person for the first time, (i.e. making graphic comments, alluding to emotional attachments." [Male, 30-39]

4.8.4 Conclusions

The findings of this preliminary study suggest that online games foster an environment in which individuals build strong social ties and form high levels of trust with others. The study revealed that for some individuals, MMORPG's provide a sense of purpose and meaning with their lives; thereby complementing Haidt's (2007) theory that people need obligation, constraint and structure in order to numb the feeling of isolation. However, in some cases, this misperception changes the dynamics of individual's life and in some cases results in addiction. As the preceding qualitative findings illustrate, such addictions are not only damaging to an individual's lifestyle and mental wellbeing but also increases their levels of vulnerability to exploitation. The theory of increased vulnerability is distilled from the fact

171

that participants are typically highly trusting within MMORPG environments and the evidence shows that manipulation and persuasion is a common facet in online gaming. Furthermore, the deep emotional investment exacerbates these vulnerabilities.

Turning to the findings specifically focused on risks, the findings indicate that the affordances of anonymity combined with the immersive nature of MMORPG's creates an environment on which emotion, isolation and the desire for a higher status takes precedence over individual safety and the protection of personal and sensitive data.

4.8.5 Privacy Risks, Motivations and Data Disclosure in Online Gaming Environments: Asian Study

The indicative findings in the preceding preliminary study found evidence of addiction and data disclosure juxtaposed with a lack of awareness of risks encountered within online gaming environments.

The second study aimed to build upon the first making use of valid and reliable scales to measure the extent of addiction, motivations of play, player behavior, social interaction and impression management. Correlation and regression analysis were performed to gain a deeper understanding of the contextual influences.

4.8.6 Methodology and Design – Asian Study

Following a small pilot study, recruitment invitations were sent to 80 Internet gaming cafes in Singapore and the questionnaire was also emailed to 150 students at a Singapore University of whom spanned across three different faculties; thus ensuring a range of student participants who were from both technical and non-technical background. Both recruitment methods provided a hyperlink to the online questionnaire. The email address of the first author was given for any queries about the study. Participants were informed that participation was entirely voluntary and that the research was conducted according to the British Psychological Society's Ethical Code of Conduct for Psychologists. If participants no longer wished to take part, they simply had to close the Internet browser. All incomplete or duplicate answers were omitted from the data prior to analysis.

Following the exploratory European study, the Asian study built upon the findings of the European study. The results of the Asian study incorporate a more in-depth statistical analysis in order to determine any statistically significant links between questions.

The sample consisted of 188 self-selected MMOPRG players from Singapore. All participants completed an online questionnaire in their own time. Of these participants, 74% were male (n = 140), 26% were female (n = 48). The mean age was 22.6 years (SD = 2 years). Of the participants who gave their country of residence, 98% were currently living in Singapore (n = 184), 1% in Canada (n = 2) and 1% in the United States of America (n = 2). The high proportion of Singaporean respondents could have possibly created a cultural bias. Lack of motivation and integrity in online based surveys are two potential concerns, but studies have shown that

web-based respondents are typically highly motivated because of self-selection. In addition, anonymity does not have an adverse effect on data integrity.

The first section asked for information about gender, age, country of origin and current residence, level of education and number of years using the Internet in the home. This is particularly included in the Singaporean data set, in contrast to the European data set, since the Singapore study was built upon the findings of the European study, which was only exploratory. The second section asked respondents where in the home their computers were typically situated and what Internet based functions were used on a daily basis.

The third section focused on addiction asking participants about their playing habits, time spent online during weekdays and weekends and the number of different avatars used in the current MMORPG game that they currently spent the most time engaging in. In addition, a 22 item Game Addiction Scale (GAS) developed by Lemmens et. al. (2011) in accordance with Griffith's (2010) 6 point behavioural addiction framework (salience, tolerance, mood modification, conflict, relapse, withdrawal symptoms) was used and participants were provided with a 7 point Likert scale ranging from "never" (1) to "often" (7). The construct validity of the GAS is found to be significantly high as both convergent and criterion validity has provided satisfactory correlations with other measures such as time spent on games. These validity tests demonstrate a strong construct validity of the GAS.

The fourth section explored impression management in MMORPG environments.

An impression management scale for organisations developed by Bolino and Turnley (2003) was adapted to fit the context of online gaming. Their taxonomy includes: *self promotion*

(pointing out ones abilities or accomplishments in order to be seen as competent by observers), *ingratiation* (use flattery or do favours to elicit an attribution of likability from observers), *exemplification* (self sacrifice or go above and beyond the call of duty in order to gain the attribution of dedication from observers – (this subscale was omitted as it was considered irrelevant to MMORPG environments)), *intimidation* (signalling of power or potential to punish in order to be seen as dangerous by observers) *and supplication* (advertisement of weaknesses or shortcomings in order to elicit an attribution of being needy from observers). Participants were presented with a 7 point Likert scale ranging from "never" (1) to "often" (7).

The fifth section used an adapted Basic Psychological Needs Scale which is central to Deci and Ryan's (2000) Self Determination Theory (SDT). The 3 needs (autonomy, relatedness and competence) were measured using a total of 9 questions (3 – autonomy, 3 – relatedness, 3 – competence) adapted to fit the context of online gaming and the construct measured the extent to which online gaming fulfilled these needs. Respondents were provided with a 7 point Likert scale ranging from "not at all true" (1) to "very true" (7).

The final section focused on data disclosure in MMORPG environments together with the type of issues discussed between online gamers. Participants were presented with an array of personal data types and were required to select the details they had previously divulged (e.g. passwords, home address, financial data).

4.8.7 Results – Asian Study

The findings of this study are divided into the following sections: Demographics, MMORPG Experiences, Player Behaviour in MMORPG's, Privacy Risks in MMORPG's and Social Interaction in MMORPG's.

Demographics

Age. The average age of MMORPG players was 22.6 years (*SD = 2.21 years*).

Occupation. The sample comprised a large majority of students (95%). The rest of the participants were in a government employment/training scheme (2%), in paid full time work (1%), in paid part time work (1%) or were unemployed (1%).

Location of PC in the home. Most home gaming computers were situated in the bedroom (68%). Other locations included the hall (38%), study room (28%) and the spare room (8%).

Years of Internet usage. The majority of respondents (88%) had been using the Internet in the home for longer than 6 years. The remaining participants had been using the Internet between 5 and 6 years (8%), 3 and 4 years (3%) and 1 and 2 years (1%).

Online application usage. The most popular online applications used on a daily basis were email (92%), web browsing (92%) and online gaming (91%). Other applications included instant messaging (86%), downloading multimedia content (75%), social networking services (68%), online banking (21%), Voice over IP (21%) and shopping (18%).

MMORPG Experiences

The most played MMORPG's are outlined in the following table:

Title	Description	% of participants
World of Warcraft (WoW)	Fantasy based multiplayer interactive role playing game with ~11 million paying subscribers in 2009. Developed by Blizzard, California and released in November 2004. Players can choose from a set of characters with differing skill sets and play in different virtual worlds known as realms. The game is set in the world of "Azeroth" – a fantasy world consisting of monsters and dragons. Players use virtual currency for buying and selling of virtual goods. Experience points and levels are accumulated from successful missions and in game combat.	32%
Maple Story	Developed in 2003 by Wizet, South Korea with ~100 million user accounts in 2010. Free of charge 2D side scrolling role playing game focusing on venturing into dungeons and combating monsters in real-time. Experience points and virtual currency is obtained from successful missions.	14%
Cabal Online	First released in 2005 by ESTSoft, South Korea. Free of charge 3D online role playing game set in the world of "Nevareth". Centred on killing monsters by groups of players known as guilds. Experience points and virtual currency is awarded for successful missions.	6%
Granado Espada	First released in 2005 by IMC Games, South Korea. Subscription based fantasy game which takes place on a newly discovered	4%

	continent based on the Americas during the Age of Exploration. Regions include forests, tropical jungles, plains, swamps, desserts and ice fields. Experience points and virtual currency are accumulated from successful combat. Players can control many characters simultaneously.	
Ragnarok Online	Developed and first released in 2002 by Gravity, South Korea. Subscription based multi-player fantasy game which is based in a 2D world. Players develop their strength, agility, vitality, intelligence and luck through combat with other players. The setting is based on Korean comics and cartoons as well as being influenced by a wide variety of international cultures.	4%
Perfect World	Developed in 2005 by Perfect World Company, China. Heavily based on ancient Chinese mythology and set in the mythical world of "Pangu". Free to play game which relies on items sold in-game to make profits.	2%

Table 6 - Most Played MMORPG's

62 other games were named and comprised the remaining 38% most-played MMORPG"s.

Avatars. Just under one third of respondents (31%) used 5 or more avatars in the MMORPG they spent the most time playing. 40% used between 2 and 4 different avatars and just under a third (29%) only used 1 avatar. Only 13% of participants previously sold their avatar for real money and of these, 13% had regretted selling their character, highlighting the level of emotional attachment. In addition, 56% of participants had previously gender-swapped their avatar.

Time Investment. The mean average number of days per week spent playing MMORPG"s was 4.69 (*SD = 2.17).* Moreover, the mean average number of hours per weekday was 4.42 (*SD = 5.43)* compared with 4.48 hours (*SD = 3.31)* per weekend day; highlighting that the majority of participants spent an equal number numbers of hours gaming during the week and at weekends.

Lifestyle Preference. Participants were asked if they had a lifestyle choice of living in a virtual world environment or in the real world environment as we exist today. Almost one third of participants (31%) stated they would prefer to live in a virtual environment as opposed to the remaining respondents (69%) who would prefer to live in a real world environment. Moreover, a chi-squared test (X2) which compares the similarity of two distributions revealed that females showed no preference between the real (*n*=30) and virtual worlds (*n*=18), X2 (1, *N* = 48) = 3.00, *p* = .083, (where *n* denotes the category size and *N* denotes the sample size). However, a greater number of males prefer the real world (*n*=100) over the virtual world (*n*=40), X2 (1, *N* = 140) = 25.714, *p* = .001. These, and other test statistics reported in this paper also provide a measure of the probability that he results are due to chance (*p*).

Addiction. Approximately three quarters (76%) of participants were classified as moderately addicted and one quarter (24%) as highly addicted to MMORPG"s. The subscales (salience, tolerance, mood modification, conflict, relapse, withdrawal symptoms) of the addiction construct (Lemmens et al. 2009) were averaged for each participant (7 point Likert scale) answer set. Participants with an average addiction score >4 (median value of 7 point Likert scale) were classified as highly addicted and respondents with a score <4 were classified as moderately addicted. Similar results were found for self-perceived addiction with 80% of

participants categorising themselves as moderately addicted and 20% categorising themselves as highly addicted. Regression analysis, which provides a measure of the usefulness of one or more variables in predicting another, found that participants who classified themselves as highly addicted typically obtained a high addiction score from the six point addiction construct (R(N=188) = .295 p < .001). In addition, males (M=3.4614, SD=.85390) typically exhibited higher levels of addiction to MMORPG"s than females (M=3.0646, SD=1.00642). These differences were found to be statistically significant, t(186)=-2.446 p= .015), using an independent samples t-test (t) which compares the differences between the group means. There was however no significant difference in the number of hours spent playing MMORPG"s between participants categorised as highly addicted (t(139)=-.810, p=.419) and those classified as moderately addicted (t(47)=.782, p=.438).

Player Behaviour in MMORPG's

Impression Management. Participants with a subscale score of >4 (median value of 7 point Likert scale) were categorised as exhibiting high levels of self-promotion, ingratiation, intimidation or supplication and respondents with a score <=4 were categorised as exhibiting low levels of the aforementioned behaviours. The most common type of impression management behaviour exhibited within the MMORPG environment was ingratiation (high level 45%, low level 55%), illustrating that many players perceived their progression and development of in-game relationships was most effective when complimenting and praising fellow gamers. Self-promotion (high level 34%, low level 66%) was perceived to be the second most effective behaviour, whereby players talk about their experiences, achievements, accomplishments and talents in order to impress fellow gamers. Intimidation (high level 26%,

low level 74%) was found to be less frequently adopted in online gaming, suggesting that players found aggression and awkward behaviour to be less of an effective tactic. In addition, supplication (high level 15%, low level 85%) was viewed as the least effective behaviour, suggesting players who constantly pretend to require assistance in an attempt to elicit help from fellow players find this to be relatively ineffective. There was no significant difference in the adoption of impression management techniques between male and female participants.

Basic Psychological Needs (SDT) of Online Gaming. Participants with a subscale score of >4 (median value of 7 point Likert scale) were categorised as experiencing high levels of autonomy, competence or relatedness and respondents with a score <=4 were categorised as experiencing low levels of the aforementioned behaviours. The results revealed that gamers" levels of autonomy (high level 83%, low level 17%) was the most satisfied basic psychological need. Relatedness (high level 52%, low level 48%) and competence (high level 52%, low level 48%) were satisfied to an equal degree. Participant subscale scores (autonomy, competence and relatedness) were averaged to give an overall measurement of needs satisfaction derived from MMORPG"s. Respondents with an overall score of >4 (median value of 7 point Likert scale) were categorised as experiencing high levels of psychological needs satisfaction, where as respondents with a score of <=4 were categorised as experiencing low levels of psychological needs satisfaction. The majority of participants (69%) were found to be experiencing high levels of psychological needs satisfaction with approximately one third (31%) of participants experiencing low levels of satisfaction. There was however, no significant difference in basic psychological needs between genders.

Social Interaction in MMORPG's

Interaction with Fellow Gamers. The majority of participants (41%) mainly interact with online friends and some offline friends although an equal proportion of respondents (39%) interact mainly with offline friends and some online friends. Furthermore, 40% of respondents felt their relationship between their online and offline friends based friends were equally important to them.

Interaction Technologies. The most popular interaction technologies embraced by online gamers were instant messengers (80%), Facebook (44%), voice chat (37%) and SMS (32%). There was no significant difference in preference between genders save for that males (*M*=.419, *SD*=.495) preferred voice technologies to females (*M*=.111, *SD*=.319), (*t*(88.885)=-4.448, *p*<.001).

Issues Discussed. Issues discussed within MMORPG environments varied considerably, with 66% of respondent's frequently discussing game tactics, over one third (39%) often giving advice on personal issues and nearly a quarter (21%) frequently receiving advice on personal issues. Interestingly, over half of respondents (57%) rarely followed advice from fellow gamers on personal issues leaving 43% of respondents who occasionally followed advice on personal issues. The results also revealed a positive correlation between gamers that offered more advice on personal issues received more advice on personal issues (r (*N*=188) = .664 *p* < .001). Moreover, there was a positive correlation between gamers that received greater amounts of advice on personal issues tended to follow the advice given to them (r (*N*=188) = .541 *p* < .001).

Face-to-face Meetings. Just over two thirds (67%) of participants had previously met an online based gamer in person. Of these, 13% found the meeting to be completely different to what they had expected it to be whilst one third (33%) had no prior expectations. There was however no difference in expectations between genders.

Privacy Risk in MMORPG's

Data Disclosure. Each participant was given an overall disclosure score based on the number of data types they had previously disclosed within MMORPG environments. Participants with a disclosure score of >7 (median value) were categorised as high level disclosers and respondents with a score <=7 were categorised as low level disclosers. The study revealed high levels of data disclosure within MMORPG"s environments with exactly 50% of respondents categorised as high level disclosers, however there was no statistical difference between genders or age groups.

There was a weak positive correlation between the hours of game play per week and levels of data disclosure (r (N=188) = .150 p < .040), illustrating that participants who engage in MMORPG environments for excessive periods of time could be more likely to disclose greater amounts of personal and sensitive data. Moreover, a significant positive correlation between levels of addiction to MMORPG"s and levels of data disclosure was found (r (N=188) = .286 p < .001).

An analysis of variance (ANOVA) on disclosure across interaction between fellow gamers

revealed that the more gamers interacted with online based friends the higher the levels of disclosure ($F(3, 184) = 3.323$ $p = .021$). Moreover, post hoc tests showed that gamers who interacted with only offline based friends disclosed significantly less than people who interacted with some or all online based friends (all $p < .02$).

Positive correlations emerged between the SDT subscales and levels of data disclosure. Indeed, analysis showed a positive correlation between relatedness and data disclosure (r ($N=188$) = $.432$ $p < .001$) and competence and data disclosure (r ($N=188$) = $.294$ $p < .001$). However no correlation was found between autonomy and data disclosure.

Positive correlations emerged between the impression management subscales and levels of data disclosure. Indeed, analysis showed a positive correlation between self-promotion and data disclosure (r ($N=188$) = $.347$ $p < .001$), ingratiation and data disclosure (r ($N=188$) = $.285$ $p < .001$) and intimidation and data disclosure (r ($N=188$) = $.257$ $p < .001$). However no correlation was found between supplication and data disclosure.

These findings support theories by Joinson (2003) who found that the affordance of anonymity and hyper personal interaction encourages participants to disclose greater amounts of personal and sensitive information within online interactive environments.

4.8.8 Discussion – Asian Study

This study examined the effect of addiction on levels of data disclosure within Massively Multiplayer Online Role Playing Game environments together with an assessment of gamers'

vulnerabilities to exploitation and predation. Results demonstrated significant relationships between pathological gaming and high levels of personal and sensitive data disclosure.

The fact that the majority of respondents were full time university students (95%) aged between 22 and 29 years would account for the equal number of hours spent gaming during the weekdays and weekends. It is commonly acknowledged that students have more flexible work schedules during the week than an individual in full time employment. To this end, it should be noted that the student sample may not be reflective of the population more generally. In turn, given the aforementioned greater flexibility, the potential impacts of addiction for example may be less severe. This would also influence the physical location of home gaming computers, with many students only occupying one private student bedroom.

The majority of participants were very familiar with online interactive environments with 99% having used the Internet in the home for 3 or more years. To this end, the popularity and rapid embrace of online applications such as instant messengers, MMORPG"s and social networking services highlights the shift change in communication preference.

The results found the single most popular online game to be World of Warcraft (32%), however there was a large distribution of favourite MMORPG's with 38% of gamers playing games which did not require a financial subscription. It is commonly acknowledged that World of Warcraft is an MMORPG that caters for a variety of player motivations (i.e. achievement, immersion and manipulation) and thus supports findings in current literature which highlight Yee's (2006) different motivations for online game playing and suggests that

the majority of respondents are motivated by factors such as achievement, immersion and manipulation as opposed to factors such as relationship and escapism.

Almost two thirds of participants used 2 or more avatars in the MMORPG they played the most and just over half (56%) had previously gender-swapped their character. This supports previous findings of Hussain and Griffiths (2009) who found that 57% of respondents previously gender swapped their character for reasons including escapism, avoidance of inappropriate behaviour from gamers of the opposite sex and receiving free gifts and powers. The previous and present findings highlight some of the ulterior motives behind gamer-to-gamer communications and the potential for exploitation.

Consistent with current literature, a significant proportion of respondents (31%) stated they would prefer to exist in a virtual world environment in place of the real world in which we exist today. Furthermore, a small but significant number of participants demonstrated high levels of emotional attachment to their avatar and had regretted selling it for real money. Mehwash and Griffiths (2010) point out that some university students may use online gaming as a coping mechanism when faced with temporary unpleasant emotional arousal stemming from high workloads (i.e. as a mood modifier).

The results revealed the most widely adopted impression management behaviour to be ingratiation and players found complementing and praising fellow gamers to be the most effective strategy for in game progression. Furthermore, this complements theories from Joinson (2003) on the effects of hyper-personal interaction and reciprocity. In addition, the unique structural characteristics of MMORPG environments forces collaboration and

dependence between players which could perhaps influence high levels of ingratiation as peer-to-peer co-operation is an integral element of online gaming. Self-promotion of one's own skills and abilities was perceived to be an effective behaviour strategy for a significant number of participants and this is consistent with studies by Yee (2006) and Griffiths (2009) who assert that different player roles require different qualities and attributes (e.g. a guild leader is more likely to exhibit self-promotion to elicit confidence from other guild members). Intimidation and supplication were found to be less frequently exhibited behaviours and these approaches would be considered somewhat detrimental to the formation and continuation of in-game relationships.

More than two thirds of participants (69%) were found to be experiencing high levels of psychological stimulation from online gaming. Autonomy was the most satisfied subscale with relatedness and competence being satisfied to an equal degree. These findings illustrate the realism and immersiveness of modern virtual environments and provide a further justification for excessive engagement.

In-game interactions amongst participants were varied with 41% of gamers interacting mainly with online friends they know only in-game and some real life friends. Furthermore, 40% of participants felt their relationship between their online and offline friends were equally important to them, which further illustrates the level of emotional investment in online gaming. In many cases, these online based friendships are particularly salient and intense in nature resulting in high levels of trust being placed in complete strangers. Types of issues discussed provided further evidence of trust formation within MMORPG environments with over one third (39%) often giving advice on personal issues and one fifth (21%) frequently

receiving advice on personal issues unrelated to the game. Moreover, a significant proportion (43%) occasionally followed advice on personal issues and further analysis revealed a positive correlation between giving more advice and receiving more advice, highlighting high levels of reciprocity. Other findings from previous studies also suggest that levels of disclosure are higher in online interactive environments than in face-to-face contact due to perceived accountability (Oqvist, 2009).

Just under one quarter of participants (24%) were classified as highly addicted pathological gamers with three quarters exhibiting moderate levels of addiction (76%). These findings were supported by the levels of self-perceived addiction which found that one fifth of gamers perceived themselves as highly addicted. Consistent with previous findings, further analysis found that males typically exhibited higher levels of addiction than females suggesting that motivations for engagement could indeed influence levels of addiction. Surprisingly, there was no difference in the number of hours spent playing MMORPG's between participants classified as highly addicted and those classified as moderately addicted.

The study revealed high levels of personal and sensitive data disclosure amongst MMORPG subscribers with exactly half (50%) of respondents classified as high level disclosers. Furthermore, a positive correlation between the number of hours game play per week and levels of data disclosure illustrated that greater periods of playing time could induce a greater level of absorption and immersion in the game and lead to higher levels of self-disclosure. Moreover, a positive correlation between levels of addiction and levels of data disclosure further highlight the potential effect of behavioural addiction on levels of data disclosure. Whilst it is acknowledged that divulgation of certain data types (e.g. name and address)

makes an individual more vulnerable to exploitation than others (e.g. gender and age), Mitnick (2002) states that social engineers and online predators mine for all types of data in order to compile a comprehensive profile of their intended victim.

Further analysis found that relatedness and data disclosure were positively correlated and this is supported by previous psychological studies on human interaction who state that the stronger the association or connection an individual has with another, the greater the likelihood of self-disclosure. Unsurprisingly, no correlation between autonomy and data disclosure was found. Self-promotion, ingratiation and intimidation were all positively correlated with data disclosure. It is commonly acknowledged that self-promoting individuals are more likely to disclosure more about themselves in order to impress others around them, however, the correlations between ingratiation, intimidation and data disclosure are an area for future research.

From online fraud to paedophilia, it is commonly acknowledged that computer mediated communication has provided a myriad of avenues for exploitation. Indeed, the affordances of anonymity combined with the immersive nature of MMORPG's creates an environment on which emotion, isolation and the desire for celebrity-like status takes precedence over individual safety and the protection of personal and sensitive data. The present study suggests that levels of addiction to MMORPG"s are directly related to levels of self disclosure and gamer personalities influence the types of character roles adopted. Furthermore, the structural characteristics of MMORPG"s are more immersive than traditional online interactive environments and encourage end-users to disclosure greater levels of personal and sensitive data. This places significant social responsibility on online gaming vendors to

provide awareness raising information to subscribers on a) hours of game play b) risks of personal and sensitive data disclosure within MMORPG's and other digital ecosystems and c) formation of intimate relationships in MMORPG and other virtual environments. Online games are perceived as places of equality, trust and utopia, however, this study suggests that these environments could indeed be used as potential avenues for future exploitation.

4.8.9 Discussion of Cultural Similarities and Differences

Given the global emergence of and subscription to MMORPG's, the results of the Singaporean sample were analysed against a previous dataset comprising of 357 European gamers in order to reveal any cultural similarities and differences between European and Asian online gamers. The primary reason for choosing the Singaporean data for further statistical analysis was that the study built upon the findings of the exploratory European study. As previously noted, the Singaporean sample consisted of students who can spend more time in the weekday playing games, as opposed to the people in full time employment. Thus, this primary difference between the Singaporean and European sample holds significant importance in accounting for the subsequent differences between the two survey results (as is reflected in the analysis section). Furthermore, the study is also faced with a limitation of the sample being limited to students, who are not representative of the entire population due to their particular socio-demographic characteristics.

The average age of the European sample (M = 25.7 years, $SD = 4.32$) was marginally lower than the Asian sample (M=22.6 years, $SD = 2.21$ years), and there was a greater male dominance (86%) in the European demographic.

The Singaporean dataset comprised a greater proportion of students (95%), whereas the European sample comprised a more even spread of full time employees (35%) and students (48%).

Time investment varied between samples. On average, European gamers spent 5.37 *(SD =1.81)* days per week playing MMORPG's compared with their Singaporean counterparts who spent 4.69 (*SD* = 2.17) days per week gaming. Singaporean gamers who completed the survey appeared to spend more hours playing per weekday (M = 4.42, *SD* = 5.43) than their European counterparts (*M* = 4.37, *SD* = 1.64), however, European gamers invested more time in their game at weekends (*M* = 5.72, *SD* = 1.25) than did Singaporeans (*M* = 4.48, *SD* = 3.31).

The most played MMORPG in both samples was World of Warcraft, however a greater number of European gamers played WoW (67%) compared with Singaporean gamers who completed the survey (32%). Furthermore, aside from World of Warcraft, European gamers preferred subscription based games such as StarWars Galaxies (4%), Starcraft (3%) and Lord of the Rings (3%) whereas the majority of games (except World of Warcraft) played by the Singaporean sample (table 1) were subscription free.

Significantly more European gamers stated they would prefer to live in the online gaming world (53%) as opposed to the real world (47%) compared with Singaporean gamers completed the survey (online gaming world, 31%, real world, 69%).

There was little variance in classified levels of addiction between samples with 77% of European gamers and 76% of Singaporean gamers who completed the survey classified as moderately addicted juxtaposed with 23% of European gamers and 24% of Singaporean gamers who completed the survey   classified as highly addicted. Greater variance was

observed in participants self perceived addiction with 76% of European gamers and 80% of Singaporean gamers who completed the survey reported moderate levels of online gaming addiction, as opposed to 25% of European gamers and 20% of Singaporean gamers who completed the survey who perceived themselves as highly addicted. In contrast to the gender differences in levels of addiction observed in 5.2 (Addiction), no statistically significant differences between genders and levels of addition were found in the European dataset. Furthermore a t-test on overall variance in average levels of addiction between sample sets found no statistically significant difference.

Marginal variance was found between sample sets in relation to interaction with fellow gamers. Indeed, 40% of European gamers and 41% of Singaporean gamers who completed the survey interact mainly with online friends and some offline friends, as opposed to 44% European gamers and 39% of Singaporean gamers who completed the survey interact mainly with offline friends and some online friends. The remaining 16% (European) and 20% (Singaporean) interacted only with friends who they knew offline in person. In addition, a greater variance was found between the European (31%) and Singaporean (40%) respondents who felt their relationship between their online and offline based friends were equally important to them.

Comparative analysis found a significant variance between sample sets with regards to issues discussed in game between players with 4% of European gamers versus 66% of Singaporean gamers who completed the survey only discussing game tactics and 96% of European gamers versus 34% discussing personal issues not related to the game.

Significantly more Singaporean gamers who completed the survey (67%) had previously met another gamer in person compared with European gamers (38%), however, in contrast, 20% of European gamers found the experience completely different to what they had expected it to be compared to 13% of Singaporean gamers who completed the survey .

Marginal variance was found between levels of data disclosure with 56% of European participants and 50% of Singaporean participants classified as high level disclosers.

In contrast to the positive correlation between the hours of game play per week and levels of data disclosure (5.5) found in the Singaporean dataset, no statistically significant difference was found in the European dataset. Interestingly, however, the European dataset yielded a much stronger positive correlation (r (N =357) = .985 $p < .001$) between addiction and data disclosure than the Singaporean dataset (r (N =188) = .150 $p < .040$). T-test analysis conducted on both datasets revealed no statistically significant differences in disclosure levels between age groups or disclosure levels between cultures. There was however differences on average disclosure levels between cultures with Singaporean gamers who completed the survey (*M =.612, SD =1.465*) disclosing comparatively more than their European counterparts (*M =.000, SD =1.000*) (*t*(543) = -5.757, *p*<.001).

4.9 Conclusions

The foregoing studies explored addiction, data disclosure and player behaviour in online gaming environments. The findings demonstrated significant risks and a general lack of awareness amongst surveyed participants. Chapter 5 builds on these findings and explores the opportunities and risks amongst children and adolescents using focus groups.

Chapter 5: An Exploration into the Opportunities and Risks in MMORPG's with Vulnerable Individuals

This chapter investigates the opportunities and risks in MMORPGs with vulnerable individuals aged between 12 and 18 years old. The chapter begins by introducing the need for qualitative research and provides a justification for the study undertaken.   The chapter proceeds with the presentation of focus group research findings and a thorough analysis of the results. The chapter concludes with a discussion of the opportunities and risks.

5.1 Introduction

The research findings presented in the preceding chapter focused on the adult demographic. Research has found that a large population of young children and adolescents engage in MMORPG environments (Nardi and Harris, 2006), therefore, this chapter sought to understand the opportunities and risks perceived and encountered by young people. As Livingstone and Haddon (2009) note, it is important to understand the opportunities and risks from the child's perspective and that researchers should not solely rely upon accounts of parents. To this end, the 'risks' and 'opportunities' that the children are exposed to may be different from those of adults. Thus there is a corresponding need to examine children's specific experiences and perspectives.

The aim of this particular study was to ascertain participant's perceptions of opportunities and risks in online gaming environments. Therefore, the following objectives were defined:

- To identify the positive aspects of MMORPG games

- To encourage discussion and reflection on the personal benefits of gaming

- To identify the negative aspects of MMORPG games

- To gain an in-depth understanding of negative experiences

5.2 Methodology

This phase of this research requires an examination of the social world in terms of understanding the opportunities and risks faced by young people. Identifying risks is a highly subjective, human, interpretation of a situation surrounding an individual. Indeed, individuals interpret risks in different ways, with one person's perception of risk differing from another (Atkinson, 2007).

Focus group research was the chosen methodology for this study. Kitzinger (1994) defines focus groups as group discussions organised to explore a specific set of issues including people's views and experiences. Crucially, focus groups are distinguished from the broader category of group interaction as research data.

In the context of this research, focus groups methodology was chosen in order to encourage subjective in-depth dialogue between participants about shared experiences in playing MMORPGs. Where possible, participants were selected based on pre-existing friendship groups within the game.

Quality of research design is demonstrated through ensuring reliability, validity and relevance (Bryman, 2012). Reliability refers to the consistency of the measures and is demonstrated through reliable management of the collated data. Reliable management in the context of this research is through the use of effective data management controls, utilising software analysis programs such as QSR NVivo and Microsoft Excel for the storage of tabulated data. Validity is concerned on ensuring the integrity of the conclusions and is inextricably linked with reliability.

Research questions were compiled based on the aforementioned objectives in order to provoke group discussions to gain an in-depth understanding of young people's experiences.

5.3 Ethical Considerations

Ethics are a set of moral principles and as Quinn (2005) describes it as being the systematic benefit, or otherwise, of a course of behaviour. Within social research, there is long since been a tension between the way in which information is obtained and the end purpose of the information (May, 1993). In selecting individuals for whom risks can pose the most harm, a strong ethical framework must be in place to ensure that no further harm is inflicted. Therefore, there is a corresponding need to ensure that that a thorough ethical consideration for the safety and welfare of the participant groups involved.

Throughout this research, ethical guidelines remained in place, ensuring that at all times individuals were aware of the research aims and providing them with an opportunity to withdraw at any time. Part of the process of creating the research plan required that ethical

approval was obtained from Plymouth University Ethics Committee and Nanyang Technological University Ethics Committee.

5.4 Participants

Focus group studies were undertaken across 5 different secondary schools in Singapore. 4 focus groups, each of which comprised of 4 people were arranged in each of the 5 schools, totalling 80 participants. Each focus group session lasted 40 minutes and was digitally recorded.

Individual invitations were sent to the teachers of these 5 schools,. Mixed sex schools were chosen for this research in order to ensure an equal sample gender representation. All of the 5 schools sampled further were mixed schools. The focus group interviews, analysis and coding was undertaken by the researcher of this doctoral thesis.

5.5 Findings

Participants reported varying motivations for playing MMORPG's with many discussing the sociability of the online gaming arena. Moreover, it was noted that male participants had a tendency towards achievement, whereas female gamers generally preferred socialising. When reflecting on the perceived opportunities within the gaming arena, discussions typically included problem solving, leading teams, customising of avatars, being creative and learning new skills.

Younger participants frequently cited the making of new friends and developing strong social ties as reasons for their continuous play. In contrast, older participants discussed the competitive aspects associated with online gaming as their motivation for continuous play. A

smaller number of participants reported to be regular contributors to gaming forums and discussed the compilation of user generated content and add-ons.

When reflecting on perceived risks in MMORPG's, participants frequently cited spending too long playing the game, however, many respondents justified their time spent playing and did not feel it was excessive.

Younger participants felt that some scenes within their game were violent, however, all respondents felt unaffected by such graphic scenes. In-depth discussions took place on the social impact of MMORPG gameplay. Some participants asserted a communication preference of interacting with friends online as opposed to face-to-face. In one case, a respondent voices concerns of a friend who no longer joined their real life friendship due to playing their MMORPG for the majority of their time.

Participants frequently discussed the issue of cyberbullying, although none of the groups discussed any personal experiences. Respondents reported witnessing bullying within the gaming environment including 'silent bullying' in a gang oriented fashion.

Other risks reported including virtual crimes and stealing of virtual assets with two participants (across different focus groups) reporting compromising of gaming accounts.

These focus group findings revealed a range of opportunities and risks perceived and experienced by young people in online gaming environments. Juxtaposed with the

quantitative findings, the research presented thus far mix together to help inform further theory. These findings are later incorporated into the discussion of findings in Section 6.8 .

5.6 Coding

Coding of the data was carried out by systematically analysing each of the focus group discussions in turn. The approach was to examine the various risks and opportunities and to extract the elements that appeared to be of significance.

Livingstone and Haddon (2009) put forward a taxonomy that classified the opportunities and risks experienced by children in online environments. The horizontal axis of their taxonomy reflected three modes of online communication:

One -> Many	Adult -> Child	Peer-to-Peer
Content: Vulnerable Individual as Recipient of Mass Distributed Content	Contact: Vulnerable Individual as Participant in an Interactive Situation Predominately Driven by Adults	Conduct: Vulnerable Individual as Actor in an Interaction in which He/She May be Initiator

Table 8 - Three Modes of Communication (Livingstone and Haddon, 2009)

The abovementioned modes of communication were used as a lens to undertake the coding and categorisation of opportunities and risks experienced by focus group participants. Figures 10 and 11 map the categorisation of opportunities and risks to the three modes of online communication shown in the above table.
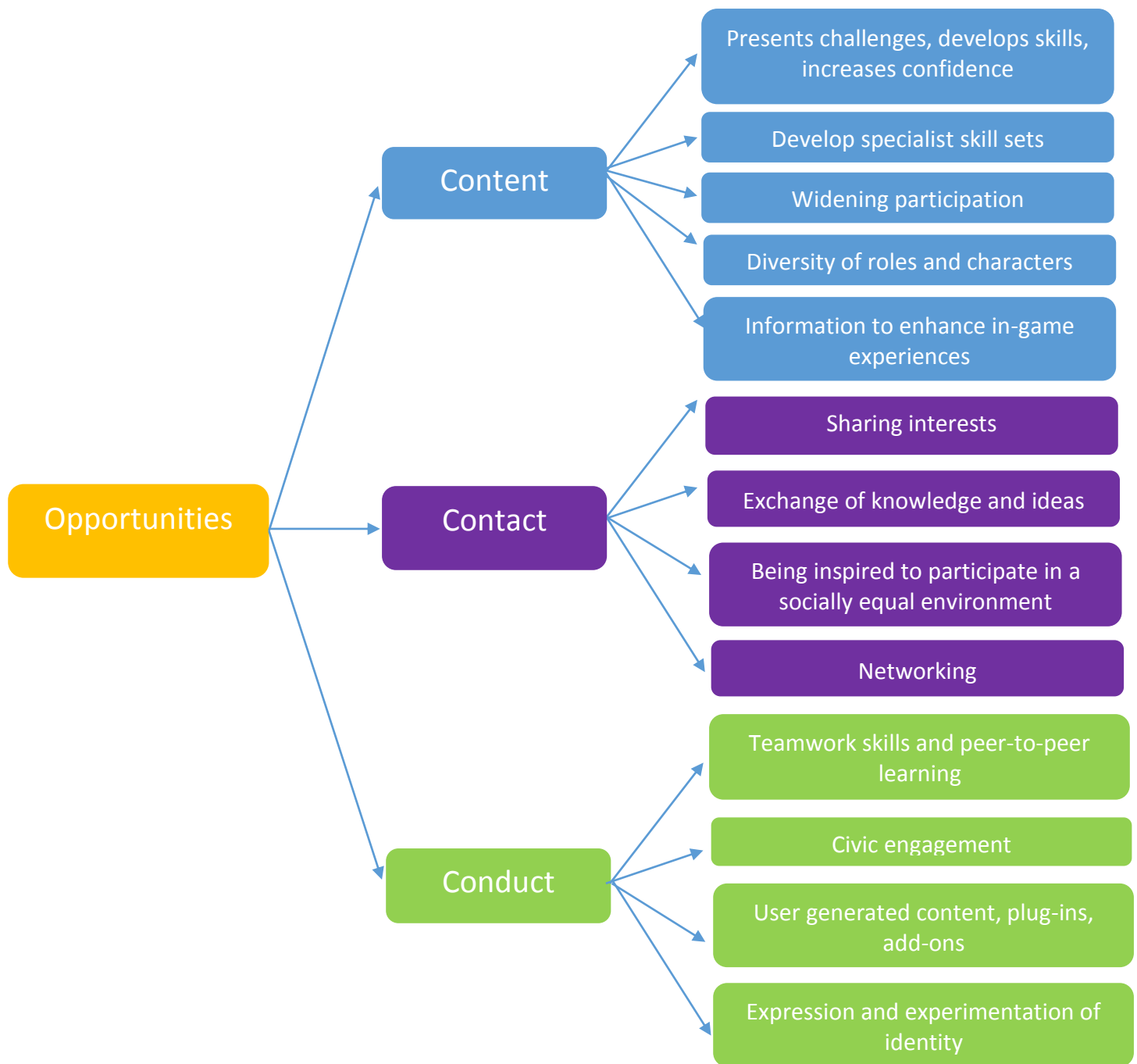
Figure 7 - Coding of Opportunities
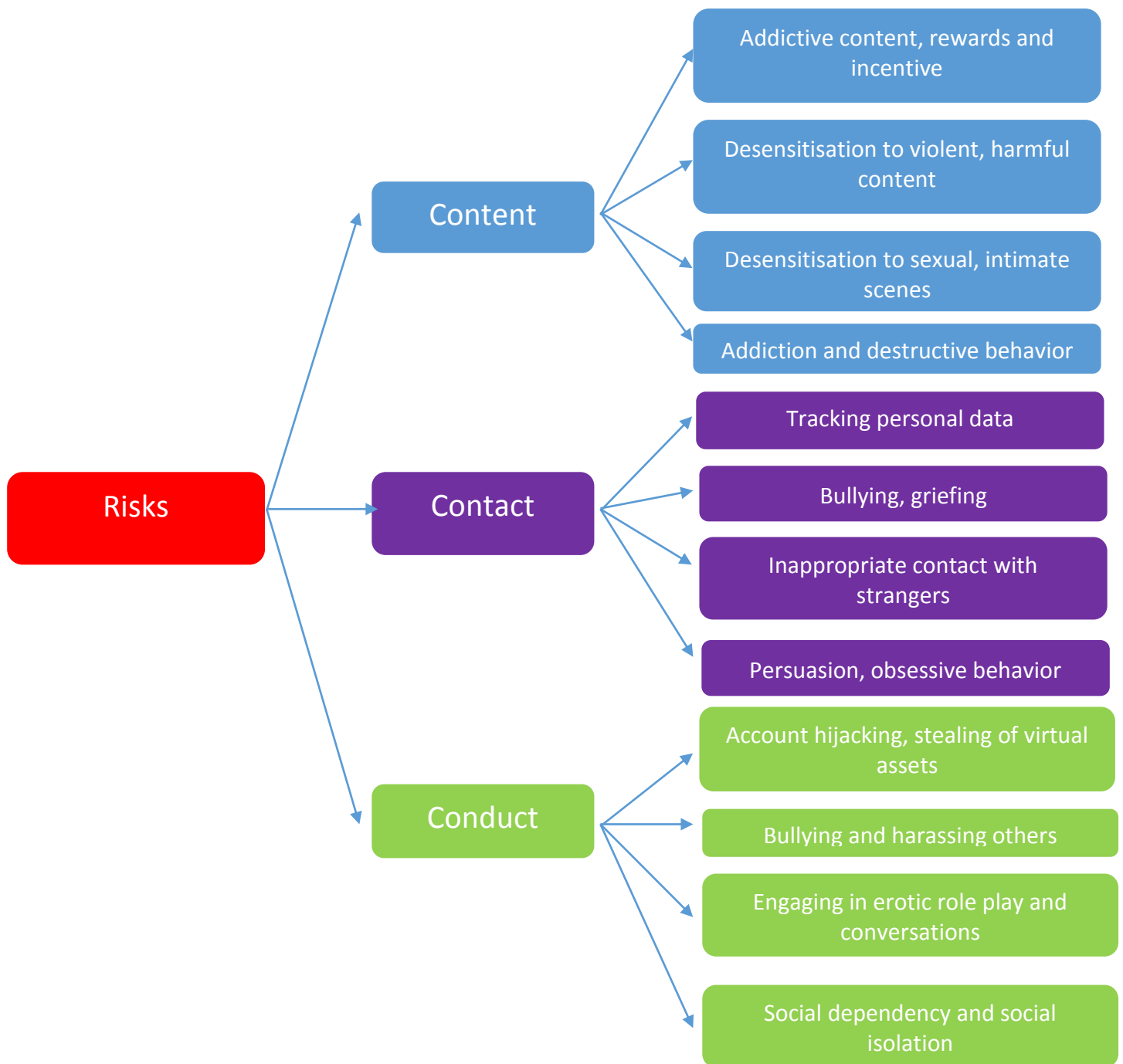
Figure 8 - Coding of Risks

The opportunities and risks put forward by participants were categorised using the taxonomy structure put forward by Livingstone and Haddon (2009) (content, contact and conduct).

Content centres around the gamer as the recipient of mass distributed content. In this context, the contact centred opportunities and risks arise from the structural characteristics of the gaming environment.

Contact centres around the gamer being a participant in a situation predominately driven by others (adults). In this context, the conduct centred opportunities and risks arise from interactions initiated by other gamers.

Conduct centres around the gamer being a participant in a situation in which he/she may be the actor or initiator. In this context, the conduct centred opportunities and risks arise from interactions initiated by the gamers themselves.

5.7 Emerging Opportunities and Risks in MMORPG Environments

Evidence collated from previous studies (Chen et. al. 2008; Yee, 2006; Hasebrink et al. 2009) juxtaposed with the findings presented in preceding chapters suggest that factors unique to MMORPG environments create emerging opportunities and risks. The collected data was evaluated to ascertain participants' perceptions of opportunities and risks inherent in online gaming environments and these are presented as follows. It is important to note that the opportunities and risks presented below represent a list generated by participants in the quantitative and qualitative studies.

Opportunities	Risks
Peer to peer learning and team work	Pathological use / addiction
Leadership skills	Social dependency to MMORPG's
Problem solving	Desensitisation to violent and sexual scenes
Engagement with emerging technologies	Social isolation from real world
Expression/experimentation of identity through role-playing	Cyber bullying (including silent bullying[2]), harassment, stalking
Networking with like minded individuals	Social engineering, hijacking of accounts, fraud, virtual crime
Diversity of cultures	Meeting strangers, being groomed
Widening participation	Tracking / harvesting personal and sensitive data

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[2] Silent bullying refers to repetitive attacks against an individual's character causing damage and hindering progress in game, without the transmission of voice or text cues.

Diversity of roles, character types and guild memberships	Peer persuasion and justification for pathological use
Exchange of knowledge and ideas amongst players	Bullying or harassing another
Being inspired to participate in a socially equal environment	Self destructive behaviour / neglect of real life responsibilities
Knowledgebase to facilitate learning of game play techniques	Bullying or harassing another gamer
Creation of user generated add-ons and plug-in for increased optimisation and game play experience	Adverse change in mentality, real life norms, morals and values
Development of unique skill sets including creativity, imagination and innovation	
Raising of self confidence	
Giving and receiving support with other players	
Increased self-disclosure (anonymity and structural characteristics of the MMORPG)	
Sense of empowerment, achievement and success	
Escapism from real life	
Entrepreneurial / business skills	

Table 9 - Emerging Opportunities and Risks

5.8 Discussion

The coded opportunities and risks constructed within Figures 1 and 2 emerged from the juxtaposition of the preceding quantitative and qualitative research and previous studies. Opportunities experienced by gamers as a result of direct interaction with the online gaming domain included:

- Presents challenges, develops skills and increases confidence. Participant responses found that users perceived their games as an arena in which they developed new skills through a myriad of challenges within the game. Moreover, some reported that playing their game gave them more confidence.

- Develop specialist skill sets. Many respondents stated that they develop unique skill sets whilst engaging in MMORPG environments. They reported that such skill sets are usually in accordance with their character's role.

- Widening participation. Previous studies juxtaposed with participant responses demonstrate that MMORPG worlds promote widening participation, enabling individuals to participate in a socially equal arena. Indeed, many participants commented on the ability to create a personalised avatar and enjoyed the opportunity to experiment with an alternative identity.

- Diversity of roles and characters. Participants frequently cited the diversity of roles and characters in online games as an attractive opportunity.

Opportunities experienced by gamers as a result of interaction with others in which the interaction is predominately driven by others.

- Sharing interests. Participant responses found that gamers use the online gaming environment as a place to share interests. Participants discussed using an array of communication channels in game including text chat and voice chat.
- Exchange of knowledge and ideas. Many respondents found that the online gaming arena provided an opportunity to share knowledge and ideas specifically around their gameplay.

- Being inspired to participate in a socially equal environment. Responses indicated that participants found their gaming environment to be a place of equality where gamers were constrained to a different set of rules to that of the real world.

- Networking. Participants found their online gaming environment to be one of the most valuable places to network with new and existing friends and develop strong social ties.

Opportunities experienced by gamers as a result of interaction with others in which the interaction is predominately driven by the individual.

- Teamwork skills and peer-to-peer learning. Participants cited the leadership opportunities within guilds and the resultant leadership skills learnt from engaging with other members. Respondents stated that they enjoy teaching others and learning from others.

- Civic engagement. Participants discussed their passion for engaging in the online gaming environment and helping others within the gaming community to develop an improved environment.

- User generated content, plug-ins, add-ons. Responses showed that some participants were motivated by the compilation of user generated content. Indeed, participants cited the creation of plug-ins and add-ons for their online game as opportunities.

- Expression and experimentation of identity. Many respondents cited experimentation of identity as a motivation for their continued engagement in the online gaming environment.

Risks experienced by gamers as a result of direct interaction with the online gaming domain included:

- Addictive content, rewards and incentives. Research (Griffiths, 2013) has demonstrated that the structural characteristics of gaming environments provide for the same psychological rewards as those experienced by pathological gamblers. Some participants recognised that the structural characteristics of online games.

- Desensitisation to violent, harmful content. Many participants cited violent and harmful content as a risk in online gaming environments. Although all respondents stated that their online game had no influence over their mood and behaviour, many felt that other players could be negatively affected by such exposure.

- Desensitisation to sexual, intimate scenes. Participants discussed the sexual nature of some online games and felt that exposure to such scenes could have a negative impact on some players.

- Addiction and destructive behaviour. The majority of respondents cited addiction as the primary risk in online gaming environments. Participants recognised that addictive behaviour can, in some case, elicit destructive outcomes for an individual.

Risks experienced by gamers as a result of interaction with others in which the interaction is predominately driven by others.

- Tracking personal data. Findings indicated that personal data is commonly disclosed in online gaming environments. Moreover, the structural characteristics of online games facilitate data mining and logging both by MMORPG vendors and individual gamers, presenting a risk to a gamers privacy.

- Bullying, griefing. Cyber bullying and griefing were the two most reported risks in the studies undertaken and presented in previous chapters. Almost all participants had experienced some form of cyber bullying within online games.

- Inappropriate contact with strangers. A smaller number of participants reported to have received unwanted contact from strangers within the online gaming environment, although none of the participants admitted that these incidents worried them.

- Persuasion, obsessive behaviour. Focus group discussions found that many participants knew of a friend or fellow gamer who they felt was obsessive about their game. Participants frequently stated that addicted gamers sometimes peer pressured others to continue playing calling their commitment to the game into question.

Risks experienced by gamers as a result of interaction with others in which the interaction is predominately driven by the individual.

- Account hijacking, stealing of virtual assets. Participants cited account hijacking and the stealing of virtual assets to be two of the most commonly experienced risks in online gaming environments. Two participants recalled incidents in which their online gaming accounts were compromised and their avatar assets transferred to other gaming accounts.

- Bullying and harassing others. Respondents discussed witnessing other gamers bullying and harassing other players within the online gaming environment.

- Engaging (initiating himself/herself) in erotic role play and conversations. Participants reported interacting with other players and guild members engaging in erotic role play within the gaming arena.

- Social dependency and social isolation. The majority of focus group respondents recognised that online games can, in some instances, causes an individual to develop a social dependency to the game environment. Furthermore, it was widely acknowledged that such a dependency could lead to social isolation.

5.9 Conclusions

This chapter further explored the opportunities and risks experienced by gamers through focus group studies. The data collected from participants gave an in-depth subjective understanding of young gamers' experiences in MMORPGs. The findings enabled the researcher to explore young people's perceptions of opportunities and risks and capture contextual information.

Within this chapter the modes of communication of Content, Contact and Conduct were used as a lens when coding the emerging opportunities and risks. Quantitative and qualitative studies formed the evidence for the coded opportunities and risks.

The following chapter incorporates the aforementioned opportunities and risks into a Novel

Taxonomy of Opportunities and Risks in MMORPG Environments.

Chapter 6: Novel Taxonomy of Opportunities and Risks in Online Gaming Environments

This chapter presents a Novel Taxonomy of Opportunities and Risks in Online Gaming Environments based on the empirical findings put forward in the previous chapters. This taxonomy framework enables future risk assessments to be undertaken and builds upon the knowledge amassed from the aforementioned findings.

The chapter continues with validation of the taxonomy framework using ethnographic research methods.

6.1 Existing Taxonomies

Several awareness raising publications have explored one or more of the opportunities and risks presented in the previous chapter; many of which also present guidelines and best practice recommendations for optimising game play experiences whilst minimising the risks to personal privacy and safety. Hayes' (2006) discusses both social and technological based risks including social engineering, identity theft, cyber prostitution, virtual mugging, viruses and worms. ENISA (2008) provides advice and best practice recommendations to parents of young children illustrating different motivations for engagement and methods for mitigating potential risks. Griffiths and Hunt (1995) investigate the impact of addiction on player lifestyle together with levels of data disclosure. Crowe and Flynn (2013) highlight the educational benefits of the online gaming arena including development of imagination, creativity, entrepreneurial and business skills.

Whilst there is a plethora of literature available on specific aspects of Massively Multiplayer Online Role Playing Games, no taxonomies exist in which the opportunities and risks in virtual world environments are defined in a cohesive and holistic fashion.

A taxonomy is an organised structure that serves as a useful lens for classifying and understanding a body of knowledge (Anton et. al. 2002). There are five taxonomies that are connected with online risk and privacy; the Privacy Goals Taxonomy (Anton et. al. 2002), Young people and risk online (O'Connell and Bryce (2006), Taxonomy of Privacy (Solove, 2006), A Taxonomy for Risk Assessment (Atkinson, 2007) and Comparing Children's Online Opportunities and Risks across Europe (Hasebrink et. al. 2009). The first taxonomy (Anton et. al. 2002) mainly focuses on privacy of data for business and commerce and identified risks are categorised into seven classes of threat. The second taxonomy put forward by O'Connell and Bryce (2006) focuses on the online risks faced by teenagers and behaviours are represented in terms of physical, psychological and social well being of children and young people. The third taxonomy (Solove, 2006) identifies privacy harms and problems. Four categories and many sub categories are identified including: Information Collection, Information Processing, Information Dissemination and Intrusion. The forth taxonomy developed by Atkinson et. al. (2007) focuses on risk assessment for two vulnerable groups: teenagers and domestic abuse survivors. Three risk categories were identified in terms of the potential impact where damage to personal privacy could take place: Propensity for Harm, Divulging Personal Information and Unauthorised Intrusion. Furthermore four categories were identified where risks to individuals manifested themselves: E-Sociability, Data Boundaries, Access Control and Technological Impact. The proposed framework aimed to provide consistency to experts responsible for evaluation of risk. The fifth taxonomy put forward by Livingstone and Haddon

(2009) and further developed by Hasebrink et. al. (2009) classified children's online risks and opportunities. The horizontal axis of their taxonomy reflected three modes of online communication: one-to-many (i.e. child as recipient of mass-distributed content); adult-to-child (i.e. child as participant in an interactive situation predominantly driven by adults); and peer-to-peer (i.e. child as actor in an interaction in which s/he may be initiator). The vertical axis was divided into two categories: opportunities and risks, with four sub categories in each. Opportunities category encapsulated: Education learning and digital literacy, participation and civic engagement, creativity and self-expression and identity and social connection. Risks category incorporated: commercial, aggressive, sexual, values (as shown below). The **_purple_** coloured cells in the table below indicate the components which were later changed/modified.

		Content: Child as recipient	Contact: Child as participant	Conduct: Child as actor
Oppurtunities	Education learning and digital literacy	Educational resources	Contact with others who share one's interests	Self-initiated or collaborative learning
	Participation and civic engagement	Global information	Exchange among interest groups	Concrete forms of civic engagement
	Creativity and self-expression	Diversity of resources	Being invited/ inspired to create or participate	User-generated content creation

	Identity and social connection	Advice (personal/ health/ sexual etc)	Social networking, shared experiences with others	Expression of identity
Risks	Commercial	Advertising, spam, sponsorship	Tracking/ harvesting personal information	Gambling, illegal downloads, hacking
	Aggressive	Violent/ gruesome/ hateful content	Being bullied, harassed or stalked	Bullying or harassing another
	Sexual	Pornographic/harmful sexual content	Meeting strangers, being groomed	Creating/ uploading pornographic material
	Values	Racist, biased info/ advice (eg, drugs)	Self-harm, unwelcome persuasion	Providing advice eg, suicide/ pro-anorexia

Table 10: EU Online Kids Taxonomy (A classification of online oppurtunities and risks for children

Hasebrink et. al. (2009) further developed the taxonomy proposed by Livingstone and Haddon (2009) and took into account that opportunities and risks are transactional results of access, usage, the child's role and underlying communicative motives. Access refers to the location in which a child can engage online and usage is concerned with the kinds of services used and

for what purpose. In addition, positive and negative consequences were identified as a result of specific behaviours defined within the taxonomy.

Whilst these taxonomies provide sound coverage of the internet environment, they do not adequately address the unique opportunities and risks inherent in MMORPG environments identified in chapter 5.

6.2 Existing Taxonomies

The first stage of development analysed the applicability and suitability of Livingstone and Haddon's (2009) taxonomy structure, including the three modes of communication (one-to-many, adult-to-child and peer-to-peer) and the categorisation of risks and opportunities. This structure was analysed in conjunction with findings from the two studies discussed in Chapter 4. The structure and category labels were considered appropriate except that the scope of 'children' was widened to incorporate teenagers and young adults. The horizontal axis labels were therefore substituted with the string of 'vulnerable individual' in place of 'child'. The scope was widened to vulnerable individuals as previous studies highlighted that a wide age range of participants engage and interact in MMORPG environments (Castronova, 2007; Yee, 2004). This also posed certain limitations for the usage of the earlier presented EU kids online taxonomy (Table 9), since several components had to be modified to better suit the adults. For instance, 'Pornographic/harmful sexual content' was changed to 'Desensitising to sexual/intimate scenes'. Overall, the process of using the same taxonomy (with moderate changes) also was limited due to the fact that children and adults categorise online activities differently, with the adults not always agreeing on definitions, especially regarding risk and particularly, across cultures. This juxtaposed with a multitude of different logics indicating the categorising of variables into more than one category, also posed the issue of overlapping items. For instance, *'Contact with other players who share one's interests'* could have been placed under the category of *'Identity and Social Connection'* as well. However, the placements of these overlapping terms was decided by the researcher keeping in mind the overall research concepts reviewed from previous literatures. In addition, the evidence base for the proposed taxonomy put forward in the following section incorporated responses from

adult participants (i.e. over the age of 18). Van Evra (2004) asserts that using adult-originated or official accounts of children's experiences in lieu of direct research with children must be recognised as problematic. In light of the foregoing the evidence base was not considered representative of children's experiences and perceptions.

The 'Values' category was adjusted to include morals, norms and lifestyle as according to findings by Griffiths and Hunt (1996) addictive elements specific to MMORPG environments can in some cases cause a change to an individual's norms, morals and lifestyle (e.g. self-destructive behaviour resulting from MMORPG addiction).

6.3 Development of a Novel Taxonomy

Combining evidence discussed in Chapter 4, Yee (2006) and Griffiths and Hunt (1995), 20 opportunities and 13 risks were identified from participant responses. The second stage of development refined the aforementioned opportunities and risks and structured them into the taxonomy presented below. The taxonomy thus obtained contains several components different from the EU Kids online taxonomy which was primarily constructed for the child population, as opposed to the taxonomy below which is specifically meant for all gamers.

		One -> Many	Adult -> Child	Peer-to-Peer		Positive Consequences
		Content: Vulnerable Individual as Recipient of Mass Distributed Content	Contact: Vulnerable Individual as Participant in an Interactive Situation Predominately Driven by Adults	Conduct: Vulnerable Individual as Actor in an Interaction in which He/She May be Initiator		
OPPORTUNITIES	Education learning and digital literacy	Presents challenges, raises confidence, develop unique skill sets	Contact with other players who share one's interest	Peer-to-peer learning and team work		Develop skills & problem solving abilities
	Participation and civic engagement	Widening participation	Exchange of knowledge and ideas amongst players	Concrete forms of civic engagement		Participation & sharing of knowledge
	Creativity and self-expression	Diversity of roles, character types and guild memberships	Being inspired to participate in a socially equal environment	User generated add-ons, plug-ins and enhancements		Creation, engagement & exploration
	Identity and social connection	Information to enhance game play experiences	Networking with like minded individuals	Expression and experimentation of identity		Identity, self-expression & social networking
						Negative Consequences
RISKS	Commercial	Addictive advertising, rewards and incentives	Tracking/ harvesting personal information	Account hijacking, virtual mugging & social engineering		Virtual Crime, financial & privacy loss
	Aggressive	Desensitising to violent/gruesome/ harmful content	Being bullied, harassed or stalked (including 'griefing')	Bullying or harassing another		Desensitisation, increased aggressiveness & harm
	Sexual	Desensitising to sexual/intimate scenes	Meeting strangers, being groomed	Erotic role play. Exposure to sexual conversation		Desensitisation and sexual harm
	Values, Morals, Norms & Lifestyle	Addiction and self destructive behaviour	Unwelcome persuasion & justification of obsessive and addictive behaviour	Social dependency to MMORPG's and real life social isolation		Time, Addiction & Dependency

ACCESS (Home, School or with friends, level of control by parents, guardians or teachers?)

MOTIVATION & USAGE (Motivations for game play, frequency and duration of engagement)

Table 101 - Novel Taxonomy of Opportunities and Risks in MMORPGs

6.4 Probability and Impact of Identified Opportunities and Risks

The probability and impact of the opportunities and risks identified in the novel taxonomy are subject to three influencing factors: access, usage and motivations. Hasebrink et. al (2009) notes that access and usage are two necessary conditions for any positive or negative experience related to the internet. In addition, Yee's (2006) highlights the wide variation of player motivations and reinforces the appeal of MMORPG's to such a diverse range of people.

Access refers to the physical location where a vulnerable individual engages with the online gaming environment. Physical locations include the home, school or with friends (Hasebrink et. al. 2009); each of which change the potential probability and impact of the defined opportunities and risks. For example, the home environment may be subject to parental control whilst the school environment could maximise educational and learning opportunities.

Motivation and Usage refers to player motivations for game play and duration of engagement. Yee's (2006) classification of motivations juxtaposed with studies on addiction and data disclosure (Chapter 4) revealed that motivation for game play and duration of engagement change the potential probability and impact of the defined opportunities and risks. For example, a player that is classified as primarily motivated by social facets of the game could be more likely to develop a social dependency to MMORPG's. Moreover, a player motivated by achievement is more likely to engage in the environment for excessive amounts of time increasing the likelihood of addictive and self-destructive behaviour. In addition, the greater amount of time invested in MMORPG play, the greater the probability of experiencing certain opportunities and risks (Hasebrink et. al. 2009).

6.5 Taxonomy Content Validation

The next stage of development was to validate the content ensuring the proposed taxonomy

was supported by empirical data (Yee, 2006; Griffiths and Hunt, 1995). The opportunities and

risks put forward in the classification by Livingstone and Haddon (2009) were analysed against

the risks and opportunities identified in the following table:

Category	Opportunity / Risk	Supporting Data & Theories
Education learning and digital literacy	Presents challenges, raises confidence, develop unique skill sets	In line with previous research (Yee, 2006; Hung et. al. 2009) participants reported their enjoyment of challenges presented in game and increased levels of confidence and self-esteem. Furthermore, evidence from the previous chapters showed that structural characteristics of the game facilitated the development of what players perceived to be unique skill sets. For example, 66% of participants stated that the game provided them with a sense of purpose and invoked a feeling of being valued and respected
	Contact with other players who share one's interest	Evidence suggests that a significant proportion of players engage in online gaming environments who are predominately motivated by the highly social element. For example, found that 53% prefer to socialise within MMORPG environments than with real world offline friends and 80% had formed particularly close friendships with other MMORPG players.
	Peer-to-peer learning and team work	Collaborative co-operation significantly increases the rate of progression in game (Cole, 2007) and respondents highlighted the importance of working as part of a team. In addition, the majority of gamers preferred to learn in-game techniques and enhance knowledge through peer observation.
Participation and civic engagement	Widening participation	It is commonly acknowledged that some players perceive MMORPG's as an environment in which all players are equal. Janger (2010) notes that online gaming is an effective way for some individuals to deal with certain disabilities. In line with Yee's (2006) work on escapism, Connell (2010) asserts that MMORPG's provide an arena for the less able to experience a sense of freedom from real life physical constraints.
	Exchange of knowledge and ideas amongst players	Participants reported that whilst the main focus of conversations were directly related to game play, a wide range of issues were discussed amongst players. Indeed, 96% of respondents discussed personal issues not related to game play (Chapters 4 and 5).

	Concrete forms of civic engagement	Evidence suggests (Chapters 4 and 5) that MMORPG's have caused a shift change in communication preferences with 53% of players preferring to socialise within online gaming areas as opposed to face-to-face contact; 52% found playing an MMORPG more exciting than going out with friends and 51% found interacting with online friends easier than conversing with real world friends (Chapters 4 and 5).
Creativity and self-expression	Diversity of roles, character types and guild memberships	Players commented on the appeal of the diverse roles and character types within the game (Chapters 4 and 5); with 31% of players owing 5 or more different avatars. Experienced players capitalise on the strengths of certain characters to compensate for the weaknesses of others within their collection of avatars. Other players highlighted the different challenges associated with different guild memberships.
	Being inspired to participate in a socially equal environment	In line with Yee's (2006) research on achievement, players are often inspired by highly skilled guild members and feel encouraged to participate. In addition, the online gaming arena is perceived by many as an environment in which players are equal and free to express themselves in forms unavailable in a real world context (Yee, 2006).
	User generated add-ons, plug-ins and enhancements	MMORPG environments such as World of Warcraft provide players with the opportunity to create user-generated content such as add-ons; plug-ins and macro scripts enabling players to personalise and enhance game play experience (Curse.com, 2010) as well as developing their innovation and creativity skills.
Identity and social connection	Information to enhance game play experiences (e.g. forums, public chat channels)	Online gaming environments are typically supported by public chat channels and forums. Players regard these facilities as important knowledgebase's for both synchronous and asynchronous sharing of information with one participant referring to the World of Warcraft forum as "an encyclopedia of game play techniques" (World of Warcraft, 2010).
	Networking with like minded individuals	MMORPG environments provide players with a fully immersive environment in which like-minded individuals can network and co-operate together to achieve shared goals. Online gamers typically have shared common interests strengthening player to player relationships.
	Expression and experimentation of identity	Many gamers experiment with their online gaming identities for a myriad of reasons including materialistic benefits and varying levels of respect from peers. Findings by Hussain and Griffiths (2008) suggest that the online female persona has a number of positive social attributes in a male-oriented environment. Their study also revealed that 57% of gamers had engaged in gender-swapping, similar to the findings discussed in Chapters 4 and 5, which

Commercial	Addictive advertising, rewards and incentives (e.g. free trials)	It is commonly acknowledged that subscriber based MMORPG environments (e.g. World of Warcraft, Everquest) offer free monthly trials to potential new customers and gamers who recently deactivated their account. Some participants highlighted the dangers of such methods to individuals with a predisposition or previous record of pathological gaming. Yee (2006) states that goals and rewards typically use a random ratio reinforcement schedule based on operant conditioning. Hence, early achievements are quick, almost instantaneous; however as a player progresses in the game the amount of time, effort and level of complexity is increased until progression becomes almost imperceptible.
		found 56% of players had previously gender-swapped. Other players prefer to use their character as a channel to express their true feelings, emotions and real life personalities (Hussain and Griffiths, 2008).
	Tracking/ harvesting personal information	Participants reported sophisticated gamer profiling through MMORPG servers. A significant proportion of players also regularly searched social networking websites (e.g. Facebook, MySpace) to reveal the true identity of other gamers. Thus increasing the opportunity for exploitation of vulnerable individuals. In addition Hayes (2006) highlights gamers concerns of insecure or compromised game servers.
	Account hijacking, virtual mugging & social engineering	Many respondents perceived account hijacking and virtual mugging to be the most common risks in MMORPG's with these risks rising exponentially with character level and experience. The term "Virtual mugging" refers to the use of software applications that run over the web, known as bots, to defeat other player's characters and take their items (Hayes, 2006). 4% of participants also observed the use of social engineering techniques to obtain account credentials and personal information.

Table 11 – Opportunities Content Validation

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Table 11 – Opportunities Content Validation

Aggressive	Desensitising to violent/gruesome/ harmful content	The effects of violent and gruesome content in videogames is a widely researched subject (Deselms, 2003; Dominick, 1984). Wei (2007) found sustained relationships between exposure and pro-violent attitudes and empathy when exposure was examined simultaneously with gender, computer use, and Internet use. In line with these findings, participants echoed similar views in the context of vulnerable individuals.
	Being bullied, harassed or stalked (including 'griefing')	Cyber bullying in online interactive environments (e.g. Instant Messengers) is not a new phenomenon, however, MMORPG's have been identified as a unique platform for new approaches of cyber bullying (Chesney, 2009). Players report frequent acts of unacceptable behaviour, including harassment and cyber stalking. In addition, many players highlighted the emerging problem of 'griefing'. It is defined as unacceptable, persistent behaviour and is typically targeted at inexperienced gamers by those with more knowledge of the gaming environment (Chesney, 2009). Griefing takes many forms and can be achieved without the transmission of voice or text cues.
	Bullying or harassing another	In line with Yee's (2006) classification, positive correlations were found between players who were predominately motivated by 'achievement' and the use of intimidation, with 26% of participants exhibiting high levels of intimidation in game. Whilst a number of online games (e.g. World of Warcraft, Runescape) have implemented anti-cyber bulling features built into games, evidence suggests their effectiveness is limited.
Sexual	Desensitising to sexual/intimate scenes	Previous research has highlighted the damaging effects of exposure to cybersex and sexually intimate scenes, with a particular concern on children and other vulnerable individuals (Schneider, 2000; Livingstone and Haddon, 2009). Reinforced by participant views, such exposure could bring a potential for harm.
	Meeting strangers, being groomed	In line with Joinson's (2003) theories of hyper personal interaction, online gaming environments are unique arenas in which players are forced to collaborate to achieve complex tasks. Trust is an integral facet of the game and is further reinforced by the mythical and chivalric setting (2006). Indeed, participants acknowledged these unique factors as potentially advantageous for individuals with darker motives.

	Erotic role play. Exposure to sexual conversation	Erotic role play and sexual conversation is a commonly acknowledged facet of MMORPG game play (McElroy, 2010) and psychologists highlight the potential damaging and desensitising effects of engaging in such behaviour (Wei, 2007).
Values, morals, norms & lifestyle	Addiction and self destructive behaviour	Addiction to MMORPG's is one of the most widely researched areas of online gaming environments (Griffiths and Hunt, 1995; Lemmens et. al. 2009) with more recent research identifying positive correlations between addiction and personal data disclosure. In addition, a plethora of research has uncovered the negative real life ramifications of pathological gaming including, financial loss, impact to family life and friendships, increased depression, anxiety and damage to career to name a few.
	Unwelcome persuasion & justification of obsessive and addictive behaviour	Twinned with addiction and addictive advertising, pathological gamers reported significant peer pressure from other guild members when attempting to reduce their hours of game play with 29% unsuccessfully attempting to cut down their hours spent playing MMORPG. In addition participants highlighted frequent justification of pathological gaming tendencies amongst players (Bell, 2007).
	Social dependency to MMORPG's and real life social isolation	In line with Yee's (2006) work on social motivations, many studies highlight the impact of MMORPG's on real world social interaction with 53% of participants preferring to socialise in MMORPG environments than real world offline environments and 51% finding interaction with online friends easier than real world friends.

Table 12 - Risks Content Validation

225

6.6 Ethnographic Study of Opportunities and Risks in Online Gaming Environments

6.6.1. Introduction

The aforementioned taxonomy of opportunities and risks in online gaming environments is based upon user's perceptions of opportunities and risks juxtaposed with their personal experiences. This data was gathered from the survey and focus group discussions conducted, along with the conceptual clarity gained from the literature reviewed.

Based on the foregoing evidence, the contextual influences model presented below builds on the model put forward by Livingstone and Haddon (2009). The establishment of these contextual factors outlines the scope of the risk (Bryman, 2012), and enables the accurate assessment of the opportunities and risks encountered (as discussed earlier in Section 2.4).
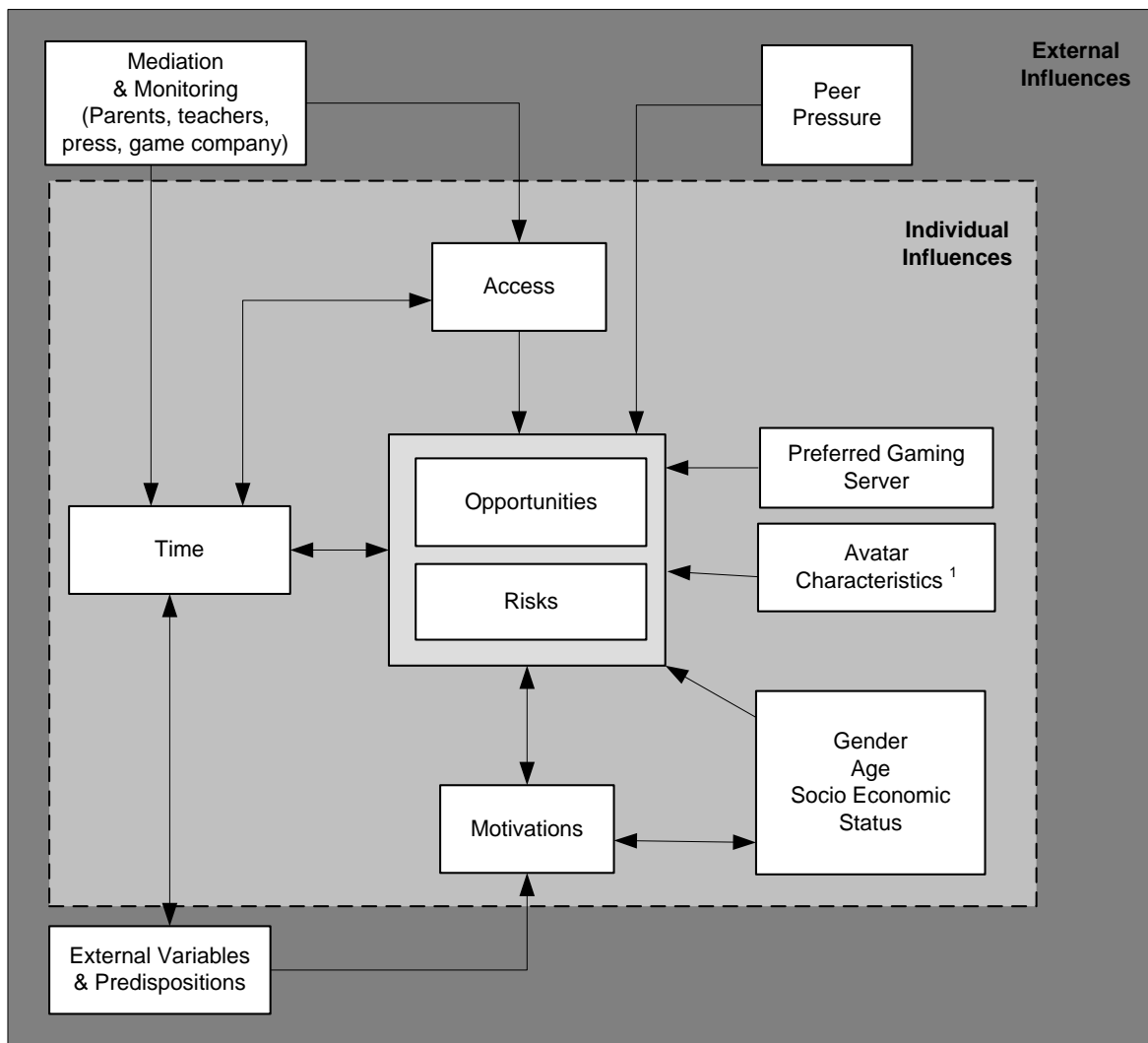
Figure 9 - Contextual Influences

The next step of the research evaluated how influential these contextual factors identified above are. The existing literature was reviewed as well as the survey and focus group evidence. In addition, an *ethnographic study* was conducted to observe the opportunities and risks in a naturalistic setting.

Ethnographic research typically involves observing target users in their natural real-world setting rather than in the artificial environment of a lab of focus group. The aim is to gather

insight into how people live; what they do; how they use things; or what they need in their everyday or professional lives (Bryman, 2013). Chen (2014) asserts, online ethnography differs from applying this methodology in real life settings as motions and interactions are all focused within the one domain.

Thus, the present study chose to adopt an ethnographic study method, which was not found to be done in any of the previous studies reviewed by the researchers. This was done with the aim of understanding gamers behaviour and experience of opportunities and risks within the complex MMORPG environment. As Grills (2008) notes ethnographic research "goes to where the action is" and allows the researcher to develop an intimate familiarity with the dilemmas, frustrations, routines, relationships, and risks that are part of everyday life.

6.6.2. Aims

The aims of this study were to:

- Provide further validation of the novel taxonomy through participant observation and interaction within a naturalistic setting
- Build on the previous findings to further understand the contextual influences that affect the probability of an individual experiencing risks.

6.6.3. Methodology and Participants

The study made use of 20 World of Warcraft MMORPG gamers who were recruited through snowball sampling methods. Participants were regular gamers who agreed to record their video gaming sessions up to a maximum of 15 hours. Email invitations were sent to the Plymouth University students together with recruitment posts in the online gaming forums. Of the 20 participants, 67% were males, with 78% of the sample lying in the age group category of 18-21 years and the remainder 22% in the category of 22-35 years.

6.6.4. Coding

A total of 287 hours of recorded game play was coded and analysed using NVivo. The taxonomy of opportunities and risks was used as a lens in the coding process. In addition, in collaboration with Blizzard/Activision, the researcher interacted with gamers within the online arena to further understand their behaviour and propensity of experiencing opportunities and risks. The interaction enabled the researcher to gain insights into player behaviour in a way which would not have been possible through the previously discussed studies. For instance, the interaction with the gamers on instant messaging group chats, revealed the aggressive and impatient tone of the male players who were found to use explicit words otherwise deemed inappropriate for their age.

6.7 Contextual Influences

Having developed the taxonomy of opportunities and risks in online gaming environments, consideration was given to how contextual influences affect the probability of a vulnerable individual experiencing risk.

The findings of the ethnographic investigation provided validation of the novel taxonomy.

6.8 Discussion of Findings

The following table presents a discussion of the findings and attempts to validate the contextual influences model presented in the preceding section:

Contextual Influence	Result of Contextual Influence	Transactional Risk	Evidence Sources	Explanation
Mediation & Monitoring	Low	Unwanted intrusion and data disclosure	Existing Literature	Guidance and boundaries illustrate that parental and teacher mediation influences a child's propensity to harm online. Children are influenced by media advertising. Time and access can be mediated through guidance and boundaries. It is fair to assume that time and access can to a greater or lesser degree be influenced by parental/teacher monitoring.
			Existing Literature	Mediation (in particularly parental monitoring) and role modelling of safe use can lead to safer use of the internet with increased awareness of online risks and e-safety best practice.
			Existing Literature	Previous research has established that good parental role modelling juxtaposed with appropriate guidance and boundaries raise young people's awareness and self protection abilities.
			Focus Groups	Focus group participants showed an awareness of the dangers relating to personal and sensitive data disclosure and the need to be vigilant about security whilst in the online gaming world.
			Focus Groups	Of the participants who stated they felt their parents monitored their online gaming experience, three approaches emerged: restriction on the number of hours per day online (time), physical location of the gaming device in the home (access) and regular discussions regarding online behaviour and experiences. The majority of these participants felt they were equipped with the knowledge and resilience to cope with risks and knew the appropriate reporting mechanisms in the event of unwanted contact.

			Focus Groups	Of the participants who stated their parents exercised little or no concern over their online gaming and online interactions, some felt confident they had the knowledge and resilience to handle unwanted contact and others were either unaware of the risks or unconcerned, and believing they would not be victims.
			Ethnographic	Gamers were observed disclosing personal information such as email addresses, instant messenger user names and information pertaining to their physical location.
			Focus Groups	Levels of mediation and monitoring varied between focus group participants. Many reported playing MMORPGs at home alone or with siblings after work whilst parents were working. The majority of participants reported living with Migrant Domestic Workers (MDW) who for the most part did not put forward any guidance or boundaries regarding their online gaming.
Mediation & Monitoring	Low	Pathological gaming, behavioural addiction	Existing literature	Excessive time playing online games will, to a greater or less degree, deprive a child of their developmental needs (e.g. school work/education).
			Focus Groups Survey Study	Keeping in mind that amount of time online spent playing MMORPG's was one of the factors which focus group participants stated that their parents exercised control over, a strong positive correlation was found between number of hours spent playing online games and score on the Game Addiction Scale (GAS).

Time	More than X number of hours per day + days per week	Unwanted intrusion & data disclosure	Survey	Strong positive correlation was found between the number of hours playing MMORPG's per day and levels of data disclosure within the online gaming environment.
			Existing literature	Theories on social engineering and child exploitation discuss the importance of building trust of victims. Keeping in mind the positive correlation between the number of hours online and levels of data disclosure juxtaposed with strong levels of trust between players, highlights that the greater time spent online could predict higher levels of data disclosure.
			Focus Groups	Focus group participants reported strong levels of trust between fellow players, particularly in guilds. Players reported to be very trusting of one another due to the interdependency between gamers which is required for faster progression in many MMORPG's.
	More than X number of hours per day + days per week	Pathological gaming, behavioural addiction	Existing literature	It is commonly acknowledged that pathological gamers by definition spend excessive amounts of time playing in the online world.
			Survey	Strong positive correlation was found between number of hours online and behavioural addiction scores. Regression analysis inferred that the greater number of hours spent online leads to pathological gaming, behavioural addiction.
			Focus Groups	Many focus group participants denied being in anyway addicted themselves but commented on how easily other players become addicted. Their perceptions of why some players become pathological gamers varied considerably with the most common explanations being spending too much time in the world, wanting to live a second life, explore different identities, fulfilment of needs such as socialising, variety and 'being needed and valued' that are not necessarily otherwise fulfilled

				in the real world environment. One of the most prominent answers was the gradual increase in the number of hours spent playing the game.
	More than X number of hours per day + days per week	Desensitisation to violent, gruesome, harmful scenes	Existing literature	Existing literature suggests that prolonged exposure to violent online games can lead to greater elevations in aggression. Whilst the literature is someone contradictory in its conclusions, there is a general consensus that repeated and/or prolonged exposure could cause desensitisation.
	More than X number of hours per day + days per week	Desensitisation to sexual scenes	Existing literature	Existing literature reports that exposure to sexual content and sexier advertisements at a young age can lead to desensitisation. There is a general consensus that repeated and/or prolonged exposure could cause desensitisation.
Access	Private Area	Unwanted intrusion & data disclosure	Focus Groups	The majority of focus group participants stated they preferred to play their game in private to allow them more freedom to express themselves without interference from parents or siblings. In addition, participants who reported that parents insisted the family computer was placed in a communal area of the home would engage in more risky behaviour when parents and siblings were away from the immediate vicinity.
			Survey	T-tests between public area and data disclosure and private area and data disclosure revealed that gamers whose computer was located in a private area disclosed more information than gamers who computer was located in a public area. Indicating that risk taking behaviour is more likely when a child is playing the game in an exclusive private setting.
			Focus Groups	A trend emerged from participant responses showing that players who were physically situated in the communal areas of the home tended to communicate using text based chat whereas those who played in private

				rooms tended to prefer communicating using voice and headset. Reasons included privacy in interactions and disturbing other family members.
	Private Area	Unwanted contact and predatory behaviour. Being groomed	Existing literature	Existing literate states that, in the context of children, online predators attempt to establish exclusivity with their victim during the grooming process, in order to avoid detection from parental monitoring.
			Focus Groups	Focus group participants reported incidents of inappropriate behaviour over private text chat and predominately over voice headsets. There was a general consensus that unwanted and persistent contact over in-game text communication was through private one-to-one channels.
			Focus Groups	Participants reported receiving many requests for email addresses and social networking usernames from other players. Many participants also admitted to asking other guild members for email and Facebook in order to verify and establish real identity.
Motivations	Social	Unwanted intrusion and data disclosure	Existing literature	Yee's taxonomy of motivations consisted of three main components: Achievement, Social, Immersion and a set of corresponding sub-components. The Social component lists the following sub-components: Socialising (casual chat, helping others, making friends), Relationship (personal, self-disclosure, find and give support) and Teamwork (collaboration, groups, group achievements). Literature suggests that the more sociable someone is or becomes the more they disclose about themselves.
			Focus Groups	The vast majority of focus group participants discussed the giving and receiving of help and high levels of trust forged between players in the game. Some stated that inter-player trust is a critical element of the game and effective team work significantly expedites progress through the levels and experience. Many reported to have formed strong bonds and high levels of trust, especially amongst fellow guild members and

			Survey	have often discussed personal issues and problems through private communication channels. Gamers who reported to be social players reported to communicate with other players in environments external to the game including social networking sites, instant messengers and mobile text messaging. Further evidenced with 41% of survey participants interact mainly with friends known only online and 40% felt their relationship between their online and offline friends was equally important to them. In addition, 39% of survey participants give advice on personal issues, 21% receiving advice on personal issues, 43% occasionally followed advice on personal issues.
			Survey	Strong positive correlations were found between higher scores of social motivation and levels of data disclosure. Correlations between achievement and data disclosure and immersion and data disclosure were not statistically significant.
	Achievement & Immersion	Pathological gaming, behavioural addiction	Existing literature	Yee's taxonomy of motivations consisted of three main components: Achievement, Social, Immersion and a set of corresponding sub-components. The Social component lists the following sub-components: Socialising (casual chat, helping others, making friends), Relationship (personal, self-disclosure, find and give support) and Teamwork (collaboration, groups, group achievements).
			Survey	Strong positive correlations were found between higher scores of achievement and scores of pathological gaming, behavioural addiction. Strong positive correlations were also found between higher scores of immersion and pathological gaming, behavioural addiction. Correlations between social motivation and pathological gaming, behavioural addiction were not found to be statistically significant.

			Focus Groups	Focus group participants, who reported to be motivated by achievement and immersion, enjoyed spending many consecutive hours playing in long, strategic quests. Gamers motivated by achievement generally played with characters of the highest experience and skill levels (and it is commonly acknowledged from existing literature that excessive amounts of time are required to reach the top levels of skill and experience). Some commented on the level of respect from other players and their ability to lead others. Some gamers predominately motivated by either immersion or achievement reported escaping from real life issues and preferred to live in the virtual world environment and enjoyed spending as much time as possible "living a different and perfect lifestyle".
			Existing literature	
Gender	Male	Harassing, cyberbullying, another	Focus Groups	The majority of male focus group participants reported being motivated by achievement. Some males admitted being involved in applying pressure on fellow guild players when they felt that a particular team member was under performing. Participants reported that players (in particular males) expel underperforming gamers from guild groups and abuse is transmitted verbally across Ventrillo chat when quests fail.
			Ethnographic	The tone and temperament of players, was in the majority of instances related to performance in the game. In guild and group situations, failure on tasks, in some cases, resulted in angry apportionment of blame, often with the use of expletives. Anger was more often exhibited by males over voice chat in public communication or guild group channels. Victims of blame and abuse often retaliated with a defensive approach, using similar language to that of the instigator.
	Male	Pathological gaming, behavioural addiction	Survey	The majority of male respondents were motivated by achievement and a t-test revealed a greater proportion of male respondents showed higher levels of addiction than female respondents.

			Focus Groups	The survey findings were reinforced by the findings of the focus group studies. A trend emerged amongst male participants who discussed their motivation to achieve and lead others in the game. Many stated they enjoyed spending as much time as allowed or possible playing the game and their favourite aspect was the competition element and playing with friends. The majority of female participants stated they preferred to socialise and make new friends in the online gaming world and spend equal amounts of time socialising with friends on social networking sites and instant messengers.
	Female	Unwanted contact and predatory behaviour. Being groomed.	Focus Groups	Female focus group participants discussed having previously received inappropriate, unwanted contact from other (mainly male) online based players. Participants reported that female avatars often receive more sexually oriented comments and remarks. Some of the female participants had gender-swapped their character as they felt it helped to lower the amount of inappropriate and unwanted contact from male avatars.
			Existing literature	Previous research states that reasons for gender-swapping include: females had previously gender-swapped to males to avoid unsolicited male approaches; out of curiosity to see how they were treated differently as a different character; playing a female character gave more materialistic benefits in-game from fellow male players; specific tools, skills and attributes associated with a specific gender.
			Ethnographic	Ethnographic observations reinforced the findings from both the focus group study and existing literature. Observations revealed that female characters receive greater amounts of attention and communication from male avatars. Inappropriate comments and occasionally sexual innuendo

				were observed. In contrast, female players were observed receiving free gifts of weapons and gold from fellow male players.
Avatar Characteristics	Combined Level and skill (High)	Unwanted intrusion and data disclosure	Focus Groups	Focus group participants discussed incidences of social engineering and stealing of virtual assets, characters and misplaced trust. Participants reported that the higher the skill, experience and weapon levels, the greater the likelihood of the character being victimised.
			Existing literature	Characters with top levels of skill, experience and in particular those with special/rare weapons are sold on auction websites such as eBay for sums in the region of $500-$1000 dollars illustrating the market and demand for such highly skilled avatars. Gold farmers mine virtual assets such as gold in exchange for real money. 80% of gold farmers are in China. Nearly 1.2bn of make-believe currencies are traded in China with 100,000 full time gold farmers working in the country. In response to incidents involving the stealing of accounts and character assets, World of Warcraft players are now provided with a token authenticator which adds an additional layer of security to the account. Therefore the greater the level of skills, experience and weapons the greater the likelihood of becoming a victim. Researchers document issues of redress in relation to 'virtual law' together with issues of ownership.
	Combined Level and skill (Low)	Victim of griefing, trolling, cyberbullying	Focus groups	Focus group participants reported that new and unskilled/underperforming players are labelled as 'newbs' and often are the centre of ridicule or blame for a failed quest. Mentioning that becoming a member of an established guild can be difficult and guild leaders exert their power evict players that they either don't like or are underperforming which had for some focus group participants reportedly

				stirred up negative emotions. Participants discussed incidents of guild leaders misusing their power, particularly with new and inexperienced players. Participants also reported observing cyber bullying within the online gaming environment including, repetitive group attacks, text and voice insults over the respective communication channels and 'shouting' (broadcasting) insults to the members in the virtual area.
			Ethnographic	Failure in guild quests often resulted in blame apportionment and the use of vulgar language. Weaker players would sometimes receive insulting comments relating to their underperformance and players eviction from a guild/team were by majority voting. The use of obscene language and angry insults were commonplace within the environment with a particular trend emerging of insulting 'newbie' players.
	Avatar Gender (Female)	Unwanted contact and predatory behaviour. Being groomed	Focus Groups	Participants reported that female avatars often receive more sexually oriented comments and remarks. Some of the female participants had gender-swapped their character as they felt it helped to lower the amount of inappropriate and unwanted contact from male avatars.
			Existing literature	Previous research states that reasons for gender-swapping include: females had previously gender-swapped to males to avoid unsolicited male approaches; out of curiosity to see how they were treated differently as a different character; playing a female character gave more materialistic benefits in-game from fellow male players; specific tools, skills and attributes associated with a specific gender.
			Survey	Keeping in mind that the majority of female participants are predominately motivated by the social aspect of the game, it would be fair to assume a predator could potentially build a rapport more easily with a female avatar.

			Ethnographic	Ethnographic observations reinforced the findings from both the focus group study and existing literature. Observations revealed that female characters receive greater amounts of attention and communication from male avatars. Inappropriate comments and occasionally sexual innuendo were observed. In contrast, female players were observed receiving free gifts of weapons and gold from fellow male players.
	Avatar Gender (Female)	Desensitasion to sexual scenes	Focus Groups	Participants reported that female avatars often receive more sexually oriented comments and remarks.
			Survey	32% of survey participants had previously sent personal pictures to online friends upon request. A t-test between gender and number of requests for pictures found that a greater number of females received quests for pictures than males.
			Ethnographic	Observations revealed that female characters receive greater amounts of attention and communication from male avatars. Inappropriate comments and occasionally sexual innuendo were observed. In contrast, female players were observed receiving free gifts of weapons and gold from fellow male players.
Age	Early Years Teenage	Desensitisation to violent, gruesome, harmful scenes	Existing literature	Existing literature states that children in their early years and at specific stages of teenage years are particularly vulnerable to negative cognitive influences and repeated exposure to violent, gruesome, harmful experiences may harm intellectual ability, cognitive development and affect their behaviour in future life (e.g. maltreatment or witnessing domestic violence). There is evidence to suggest negative developmental outcomes when early years and teenagers are repeatedly exposed to such scenes. Strong links between resilience/negative impact and age/cognitive development can be found.

			Existing literature	Existing literature and focus group study confirms that children under the age of 18 are participating in MMORPGs, in many cases, endorsed by their parents who provide a credit card for monthly subscriptions.
			Focus Groups	A small number of focus group participants discussed that some games allowed parents to moderate the level of blood and graphic gruesome images that are shown within the environment. Of these participants, some reported they had the ability to modify these settings and reported a better gaming experience when the restrictions were switched off.
			Ethnographic	Ethnographic observations highlighted a plethora of violent, gruesome and harmful scenes.
	Early Years Teenage	Desensitisation to sexual scenes	Existing literature	Existing literature states that children in their early years and at specific stages of teenage years are particularly vulnerable to negative cognitive influences and repeated exposure to sexual scenes may harm intellectual ability, cognitive development and affect their behaviour in future life (e.g. inappropriate sexual conduct). There is evidence to suggest negative developmental outcomes when early years and teenagers are repeatedly exposed to such scenes. There are strong links between resilience/negative impact and age/cognitive development. Furthermore, the chivalric romance and 'knight in shining armour' theme generated by many MMORPGs juxtaposed with hyper personal interaction further explains how young people are motivated to engage in risk behaviour.
			Existing literature	Existing literature and focus group study confirms that children under the age of 18 are participating in MMORPGs, in many cases, endorsed by their parents who provide a credit card for monthly subscriptions.
			Focus Groups	Ethnographic observations highlighted a number of user-generated sexual scenes.

	Early Years Teenage	Erotic role play. Inappropriate sexual conduct	Focus Groups	Focus group participants reported that peers (typically teenagers) would act out sexual scenes often in an attempt to amuse fellow guild members. They reported that in the majority of instances inappropriate noises and chat would be broadcasted over the guild voice channel and sometimes over the guild text chat channel. In addition, participants reported that in some instances, other players would join in with the inappropriate sexual conduct, whilst others would be offended and leave the guild/group. The evidence suggests that some players are indeed led by others into behaving inappropriately.
	Early Years Teenage	Unwanted contact and predatory behaviour. Being groomed.	Existing literature Focus Group Survey	It is commonly acknowledged that early years and teenagers are the most vulnerable from predatory behaviour and being groomed. Both existing literature and focus group studies highlights the high levels of trust forged between players through forced collaboration and team tasks. Focus group participants reported online based guild members to be some of their best friends, some of whom they have never met in person. The survey evidence found that 96 % had previously discussed personal issues in the online gaming environment, 38% had previously transmitted personal pictures to other online based players upon request and 89% had previously divulged personal information such as age (81%), location (77%), telephone numbers (22%), email addresses (48%) and gaming account credentials (10%). In addition, 53% of respondents mainly interact with friends they have met online and 53% prefer to socialise within the online game as opposed to socialising with real world offline friends.

Social Economic Status	Unemployed, student	Pathological gaming, behavioural addiction	Survey	A t-test between employment status and number of hours online revealed that unemployed persons and students spent significantly more time playing online games than respondents who stated they were full time or part time employed.
			Existing literature	It is commonly acknowledged that unemployed persons and students generally have a less rigid time structure in any given working day. University students typically have large breaks during normal working hours and unemployed citizens generally have few constraints on their time.
Peer Pressure	Evidence of Peer Pressure	Pathological gaming, behavioural addiction	Existing literature	Peer pressure is a common facet which influences a change in behaviour, particularly in young people.
			Focus Groups	The majority of focus group participants felt a sense of responsibility for the welfare and achievement of their guild. Participants reported observing or being subject to peer pressure regarding performance and commitment in the guild on various quests. Participants discussed the pressure exerted on them from other guild members about remaining online to assist in the achievement of a particular quest.
			Ethnographic	Outside of the online gaming arena, a small number of focus group participants reported being victims of ridicule (in the physical school environment) regarding aspects of their game playing ability, skills and experience. Some participants responded by playing the game for longer periods to improve their avatars skills and abilities. Ethnographic observations revealed many instances of peer pressure including angry verbal and text cues regarding player's skills, experience score and lack of teamwork and concentration on a particular quest.

				The expectation of high commitment levels between guild members was particularly apparent. Incidences of peer pressure were most apparent amongst guild players where there was an expectation to continue playing with the team until the quest was successfully completed.
	Evidence of Peer Pressure	Encouraging inappropriate, unhealthy behaviour	Existing literature	It is commonly acknowledged that peer pressure can influence, to a greater or lesser degree, negative or inappropriate behaviour (online or offline).
			Focus Groups	Focus group participants reported that peer pressure, particularly in guild situations has led to certain players behaving encouraging others to act inappropriately towards others. One participant reported being the victim of peer pressure where he was asked to repeatedly kill another guild member in order that weapons and gold could be taken. Some of the focus group participants stated that pressure from other players had pushed them into behaving in an unacceptable manner and thereby encouraging other guild members to behaviour in the same manner.
			Ethnographic	The ethnographic findings reflected the experiences described by the focus group participants. Observations revealed instances of groups of players pressurising others on their performance, commitment and playing abilities. In addition, players who behaved inappropriately sometimes encouraged others to join in and participate in the particular incident.

Table 13 - Contextual Influences Content Validation

6.9 Conclusions

This study maps out the different forms of opportunities and risks and validation is provided through the use of empirical data from a range of reliable and credible sources. In addition, positive and negative consequences are identified as a result of encountering one or more opportunities and risks.

For academics, the taxonomy serves as a basis for future research into opportunities and risks in Massively Multiplayer Online Role Playing Games. From an industrial perspective, gaming companies could utilise this taxonomy when developing new games and expansion packs to maximise the potential opportunities to gamers whilst minimising the potential risks.

It is, however, important to note the limitations of this taxonomy. Firstly, players may engage in MMORPG environments for a number of different reasons, some of which may change throughout their time of engagement. With this in mind, Yee's (2006) classification was not explicitly defined in the proposed taxonomy as further qualitative research is required to correlate opportunities and risks with motivations and usage. Secondly, the prevalence and associated impact of the identified opportunities and risks was not investigated, providing scope for a future ethnographical study which would further validate the contents of the taxonomy as well as understand the actual level of risk in comparison to perceived risk. Thirdly a cross-national comparison of findings would reveal any cultural biases.

Chapter 7 incorporates the findings from this chapter into the construction of a Decision

Support System to assist in the assessment and mitigation of risks to vulnerable individuals.

Chapter 7: Decision Support System for Risk Reduction in MMORPG Environments

This chapter begins with a review of the research aims, methods, data collection and justifies the need for the development of a proof-of-concept Decision Support System to assist in the assessment and mitigation of risks to vulnerable individuals in MMORPG environments. The chapter proceeds with a discussion on the design requirements of the proof-of-concept Decision Support System together with a technical specification.

Implementation and end-user evaluations are presented and the chapter concludes with a discussion of the limitations of the prototype proof-of-concept.

7.1 Introduction

Decision Support Systems (DSS) are defined as a specific class of computerised information system that support business and organisations in their decision making activities. Moreover, Decision Support Systems are designed artefacts that incorporate specific functionality (Power et al 2015). Types include: communications-driven, data-driven, knowledge-driven and model driven. Communications technologies are central to communications-driven DSS for supporting decision making. Data-driven DSS provide access to large data stores and analytics to create information. Document-driven DSS use documents to provide information for decision making. Knowledge-driven DSS are sometimes generically called expert systems or recommender systems. Model-driven DSS use quantitative models for functionality and have been called model-orientated DDS and computationally-orientated DSS. The term Knowledge Management System (KMS) encompasses both document and knowledge-driven

DSS. Holsapple and Whinston proposed a slightly different classification identifying text-orientated DSS, database-orientated DSS, spreadsheet-orientated DSS, solver-orientated DSS, rule-orientated DSS, and compound DSS.

In the context of this body of research, an exploratory proof-of-concept Decision Support System was implemented with the aim of mitigating risks to vulnerable individuals in MMORPG environments.

The model-driven prototype proof-of-concept aimed to calculate quantitative metrics from valid and reliable scales to output an indication of risk to a vulnerable individual. Consideration is given to the contextual influences arising from the preceding research experiments.

7.2 Epistemological Framework

Figure 12 provides an overview of how the underlying frameworks and theories fit together to underpin the research activities.

Research Aims:

1. To systematically explore the opportunities and risks to individuals in MMORPG's and;

2. To demonstrate how a Decision Support System might assist in the assessment and mitigation of those risks to vulnerable individuals.

Research Methods:

The research methods, case study, participant observation and patterns of association provided the underpinning methodologies to support the collection of evidence.

Data Collection:

The data collection phase utilised three different methods, namely focus groups, surveys and an ethnographic study.

Focus group research focused on gamers experiences and perceptions of opportunities and risks. This approach provided an opportunity for the researcher to explore positive and negative experiences in-depth facilitating a contextual understanding.

Survey based research made use of valid and reliable scales to generate quantitative metrics. Results were analysed using various statistical methods (e.g. correlation, regression, t-test) to identify further contextual influences.

Ethnographic research focused on participant observation in a naturalistic setting enabling the researcher to validate the findings of the previous two studies and the novel taxonomy of opportunities and risks in MMORPG environments.

Analysis:

The findings were analysed and incorporated into the novel taxonomy. Contextual influences were identified from the juxtaposition of research findings.

Design:

The design of a DDS which sought to detect, manage and reduce risk to vulnerable individuals is presented in this chapter.
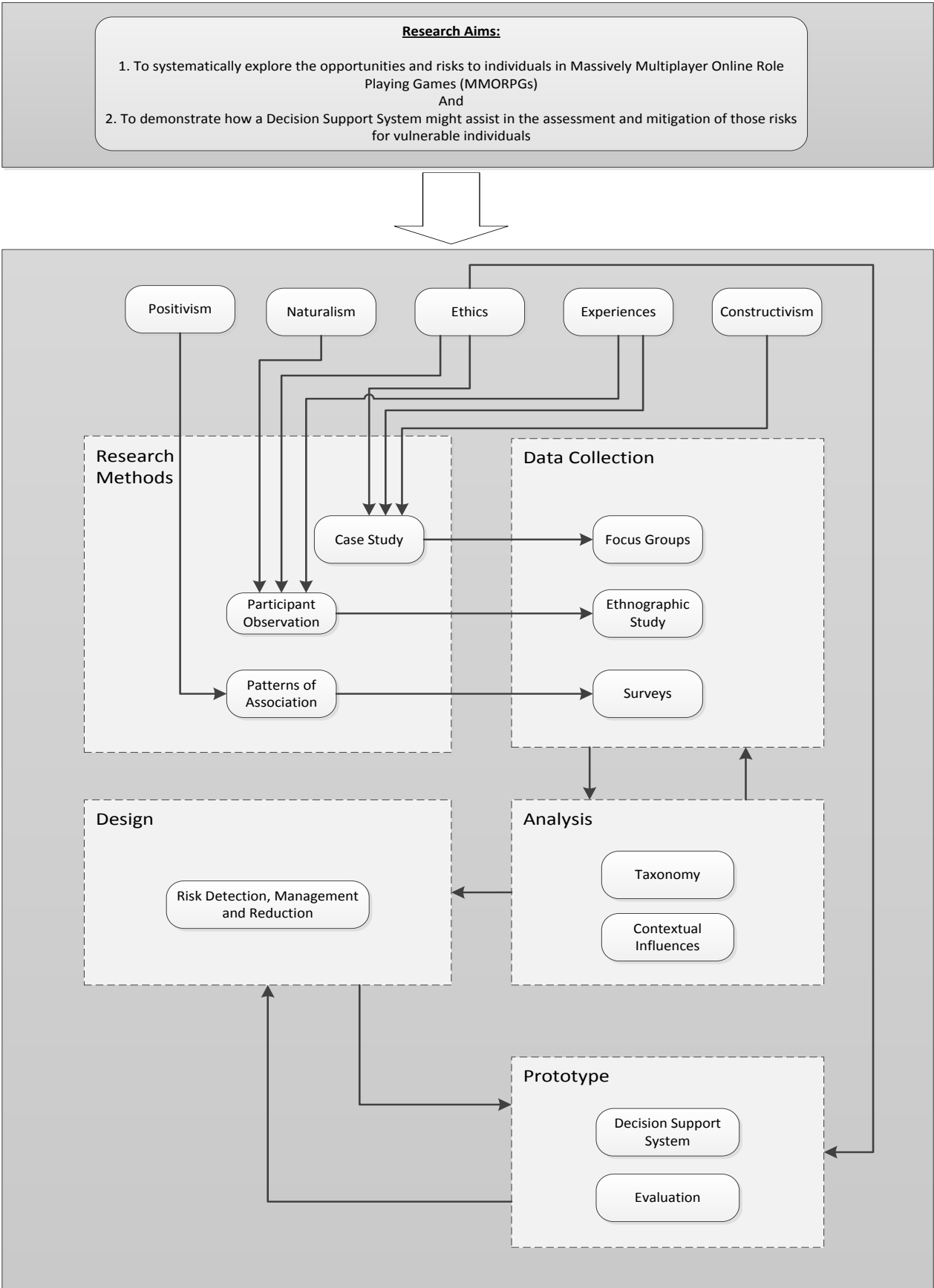
Figure 10 - Epistemological Framework

7.3 Contextual Influences

The findings of the aforementioned studies were further analysed to identify contextual influences on the transactional risks. Further examination of relevant literature provided validation of the identified contextual influences. The figure below presents the contextual influences model which influenced the design of the proof-of-concept prototype.

The contextual influences model illustrates how the contextual influences affect the probability of an individual encountering risk. Measurable units are shown below each contextual influence. The model is based on the literature reviewed together with the findings presented in the previous chapters of this thesis. Participant responses are illustrated below and the corresponding impact on the transactional risk is also presented.

The high/low decisions shown in the contextual influences diagram on the following page are made on the basis of the thresholds set by the practitioner. The threshold settings are discussed further in Section 7.5.4.

Contextual Influences

Contextual Influences

Mediation & Monitoring	Time	Access	Motivations	Gender	Avatar Characteristics	Age	Socio Economic Status	Peer Pressure	Preferred Gaming Sever
Role Modelling of Safe Use. Evidence of Guidance and Boundaries	Average No. of Hours Per Day. Average No. of Days Per Week	Public Area. Private Area	Achievement. Social. Immersion	Male. Female	Skills. Gender. Level. Experience	[5-12] Early Years. [13-17] Teenager. [18-20] Young Adult	Employed. Unemployed. Student. Retired. Disabled. Home or Family	Evidence of Peer Pressure	PvP No Restrictions. PvP Some Restrictions. PvE Some Restrictions. PvE Full Restrictions. RP-PvP. RP-PvE

Response

Low/High — Low/High — Public or Private — Achievement Immersion Social — Male Female — Level & Skill — Avatar Gender — Age Range — SES — Yes/ No — Preferred Gaming Server

Low · Low · Private · High · Achievement Immersion · Male · High · Female · Female · Male · Female · Early Years Teenager · Early Years Teenager · High · Social · Private · High · Early Years Teenager · Low · Early Years Teenager · Unemployed Student · Yes · PvP No Restrictions · PvP Some Restrictions · PvE Some Restrictions

Transactional Risks

- Unwanted Intrusion & Data Disclosure
- Tracking and Harvesting Personal Data
- Exploiting Others Privacy. Using Malicious Add-ons
- Desensitisation to Violent, Gruesome, Harmful Scenes
- Victim of Griefing, Trolling, Cyberbullying
- Harassing, Cyberbullying Another
- Desensitisation to Sexual Scenes
- Erotic Role Play. Inappropriate Sexual Conduct
- Unwanted Contact and Predatory Behaviour. Being Groomed
- Pathological Gaming, Behavioural Addiction
- Encouraging Inappropriate, Unhealthy Behaviour
- Behavioural (Operant) Conditioning

253

7.4. Design of a Prototype Proof-of-Concept Decision Support System

7.4.1 Introduction

Professionals working with vulnerable individuals and their families, if they are to accurately assess need and develop plans and strategies to improve outcomes and minimise risk, must be able to understand the context in which the aforementioned individuals are living in. Indeed, there is a corresponding requirement to increase the understanding of different types of behaviour online that may cause harm. Moreover, professionals require the knowledge to enable them to recognise warning signs, identify symptoms and understand the complexities of behaviours and relationships in the online domain.

The next stage of this research was to take the understanding of risks along with the resulting taxonomy of opportunities and risks and move towards creating a Decision Support System to identify, manage and reduce risk. Consideration was given as to how this could be achieved given the complexity of the environment, the participants and current technologies.

A Decision Support System was chosen as it provided the user with the ability to identify risks and the corresponding potential for harm. Given the complexity of MMORPG environments, a Decision Support System facilitated the assessment of identified risks without the pre-requisite of understanding of complex MMORPG worlds.

7.4.2 Design Objectives

The objective was to design an exploratory proof-of-concept Decision Support System that could provide an indication of risk to vulnerable individuals in MMORPG environments. A

number of objectives for the prototype were devised from the underpinning research studies juxtaposed with the literature introduced in previous chapters. The objectives were:

- to provide a means of risk assessment that did not require pre-requisite knowledge of complex gaming environments

- to output risk indicators to provide a means of mitigating the potential for harm

- to provide a simple and easy to use interface

- to incorporate flexibility into the design

The first objective seeks to provide professional practitioners and individuals with the ability to understand and assess risk in gaming environments without a pre-requisite understanding of complex gaming arenas. Indeed, it is commonly acknowledged that access to such environments are restricted only to those who understand the gaming world. This objective sought to overcome this obstacle.

The second objective attempts to provide a system to support the identification, management and reduction of risk and to mitigate the potential for harm by providing the end-user with a series of risk indicators based on inputted metrics.

For the prototype to be successful in achieving its objectives, a simple, easy to use interface that reduces the individual's information load is required. The purpose of the prototype is to allow professional practitioners and individuals to understand risks and the potential for harm in online gaming environments.

The final objective is to ensure that the prototype is flexible in it's design in order that successive iterations of the software can be easily modified and to provide practitioners an appropriate level of control over the risk indication system.

In order to achievable a workable design, consideration was given to the requirements of end users. This involved three actor's viewpoints:

- Professional practitioners (support workers): includes individuals who support vulnerable individuals and are seeking to provide protective assistance for individuals
- Individuals: anybody who could make use of the software directly for themselves
- Organisation: any specific body that has a moral or legal obligation to protect a group of vulnerable individuals. Examples here could be schools or social services

7.4.3 Functionality

The next phase was to design in more detail how the software would address the objectives outlined in the previous section but in a way that could be achievable within a limited timescale.

- *To provide a means of assessment of the identified risks* – the overall objective was to provide the means to assess identified risks to a vulnerable individual. A series of questions from valid and reliable scales would be used to measure the identified risks. Answers to these questions would be computed against the answers to the contextual

variables to output any indication of risk. A facility to amend questions and scales would also be included.

- *To incorporate flexibility to determine appropriate alert thresholds* – the software would enable the individual or professional practitioner to adjust risk threshold levels in order to reduce false positives after an initial pilot testing period.

- *To output risk indicators for the assessed individual* – the software would output warning indicators if the individuals risk score exceeds the set threshold level.

7.4.4 Risk Analysis Engine

The Risk Analysis Engine (RAE) framework comprises of three main elements: a set of scales and questions, a rating mechanism and an indication output mechanism.

The assessment questions are separated into various sections to measure risks in isolation. The questions within the framework are taken from empirical studies and also based upon the information used within the taxonomy of opportunities and risks presented in the previous chapter. The assessment questions gather information about the individual's propensity to harm and their experience of risks.

As this piece of software is exploratory in nature, the risk assessment thresholds are determined by the practitioner and it is envisaged that threshold standards would be established after a period of pilot testing. Therefore, the rating mechanism computes the level of risk in accordance with the risk assessment thresholds.

The indication output mechanism is responsible for comparing the quantitative scores against the defined thresholds. Outputs are in the form of text warnings juxtaposed with a traffic light system.

7.4.5 Architectural Framework

Given the requirements of the prototype, careful consideration was given to the construction of the prototype Decision Support System. The following conceptual framework was considered to provide the most suitable design for the prototype. Indeed, the figure below demonstrates the data inputs and calculations between the contextual influences and transactional risks. Risk indicator warnings are categorised based on previously defined risk categories and text outputs provide information regarding possible consequences. The proposed architecture sought to provide both visual 'traffic-light' risk indications together with text based outputs based on empirical data. In addition, careful consideration was given to the use of appropriate, valid and reliable scales.   Figures 13, 14 and 15 provide an overview of the risk assessment scales used.
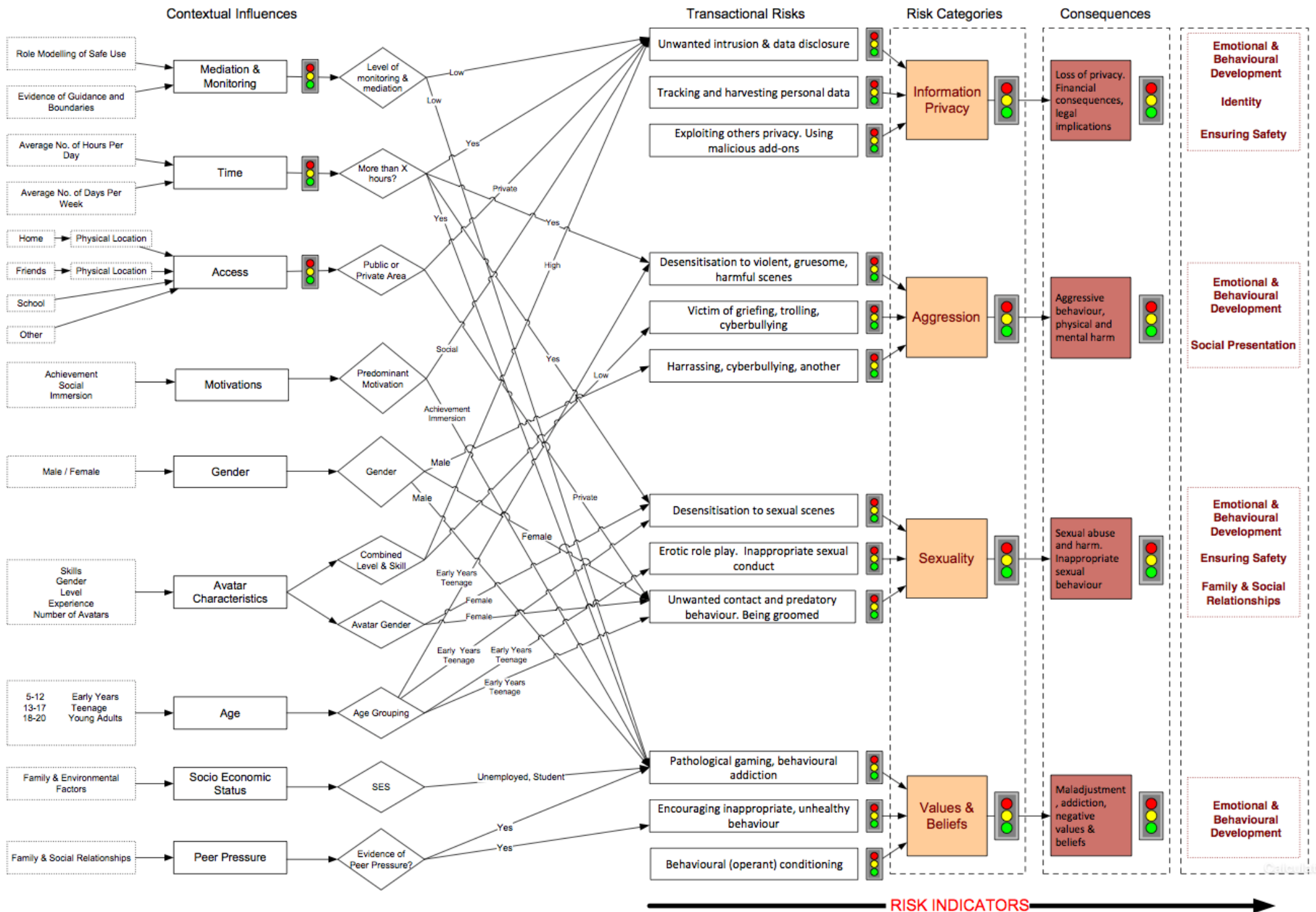
Table 14 - Architectural Framework
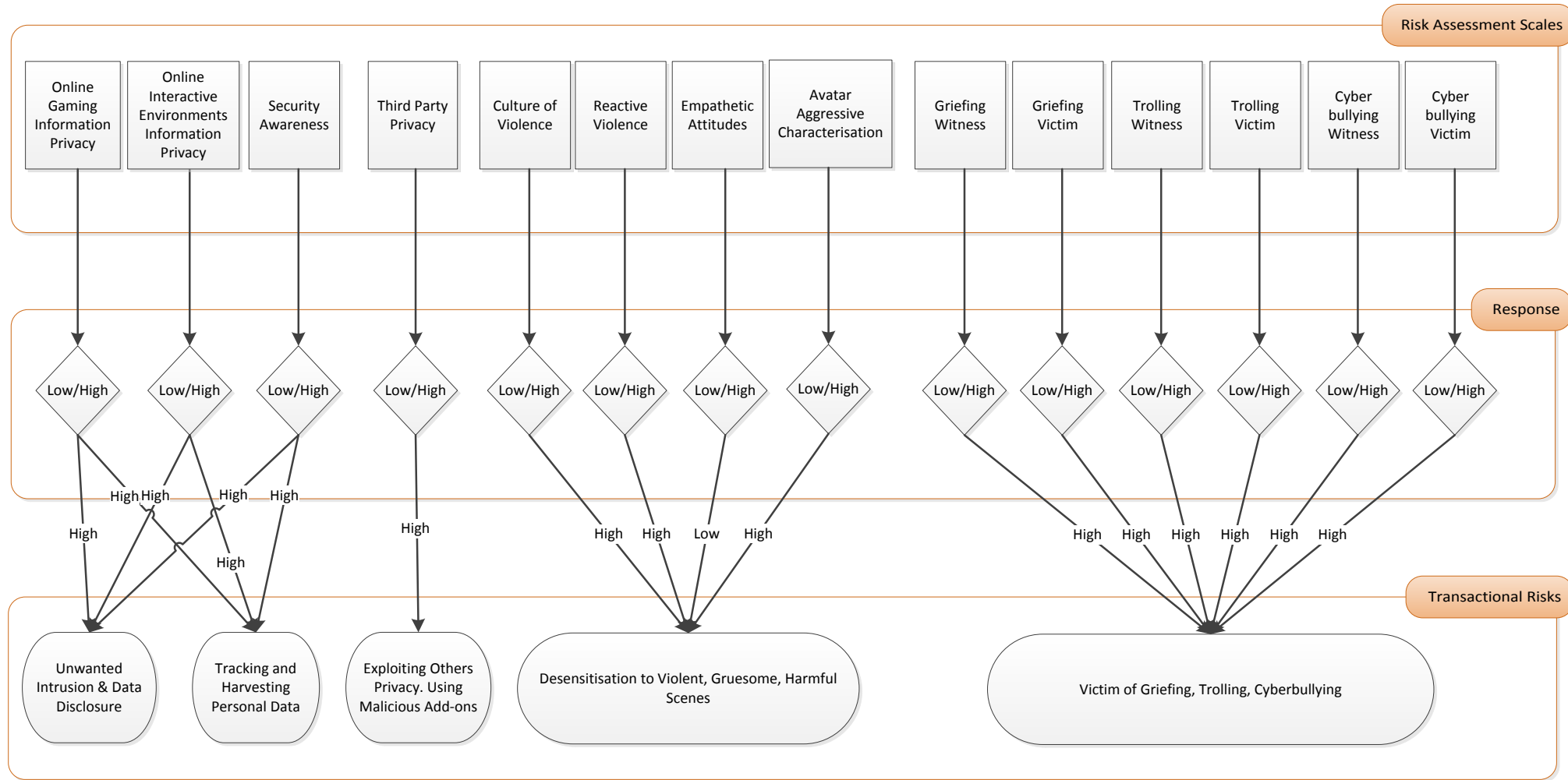
Figure 11 - Risk Assessment Scales 1
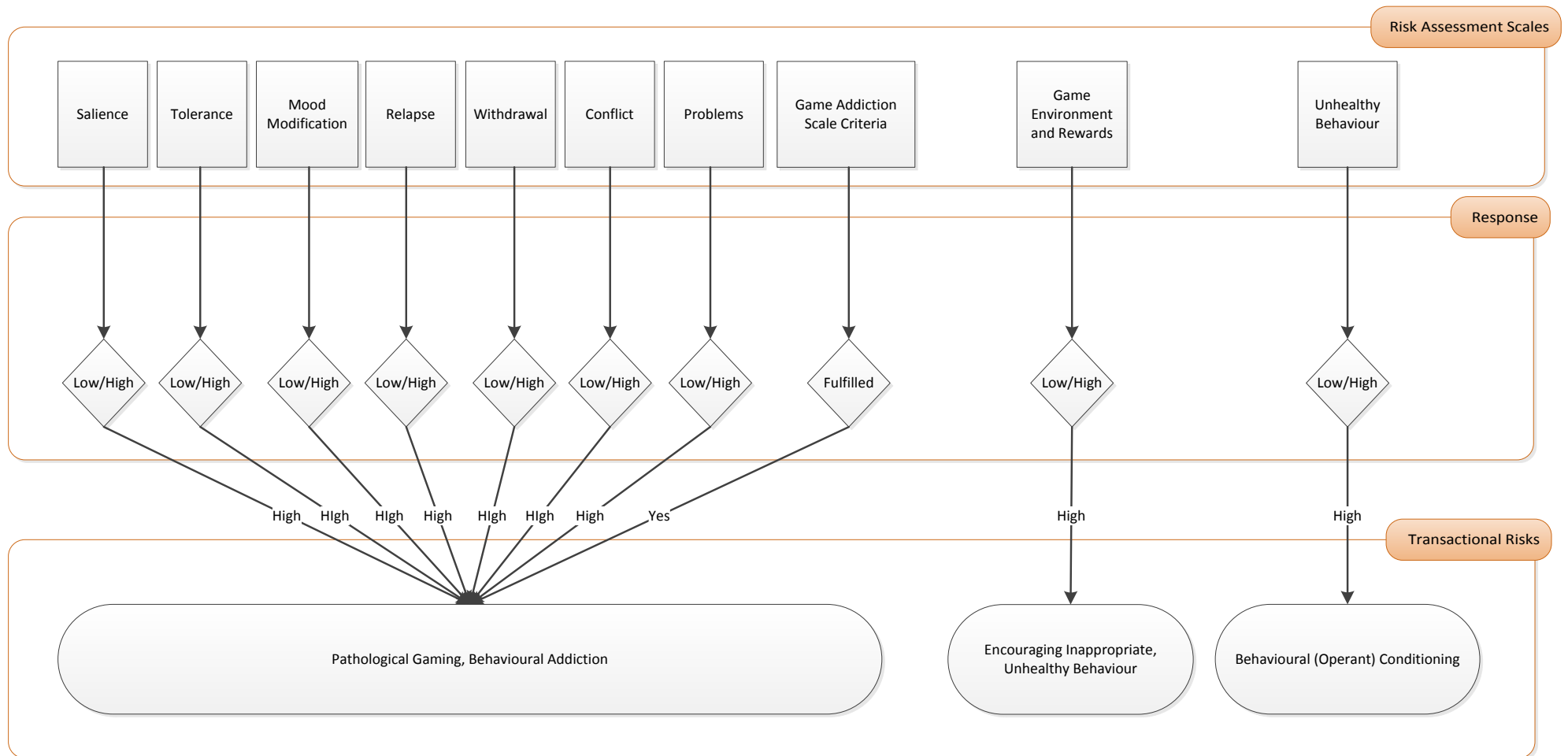
Figure 12 - Risk Assessment Scales 3

7.4.6. Architecture – Unified Modelling Language (UML)

Unified Modelling Language (UML) diagrams are a standard visual modelling language that are commonly used in the analysis, design and implantation of software-based systems. UML can be applied to diverse application domains (e.g. banking, finance, Internet and healthcare). It can be used with all major object and component software development methods and for various implementation platforms (Fowler, 2003). UML activity diagrams were considered the most appropriate vehicle for developing the architectural framework into an implemented proof-of-concept.

The conceptual architecture put forward in figure 16 demonstrates how the Risk Analysis Engine (RAE) calculates the risk scores. The RAE uses two scoring systems, namely, Warning Level (WL) and Alert Levels (AL). The former provides a cautionary warning in the output of an amber traffic light together with a text based description of the warning event. Alert Levels provide a risk indication in the output of a red traffic light together with a text based description of the identified risk.
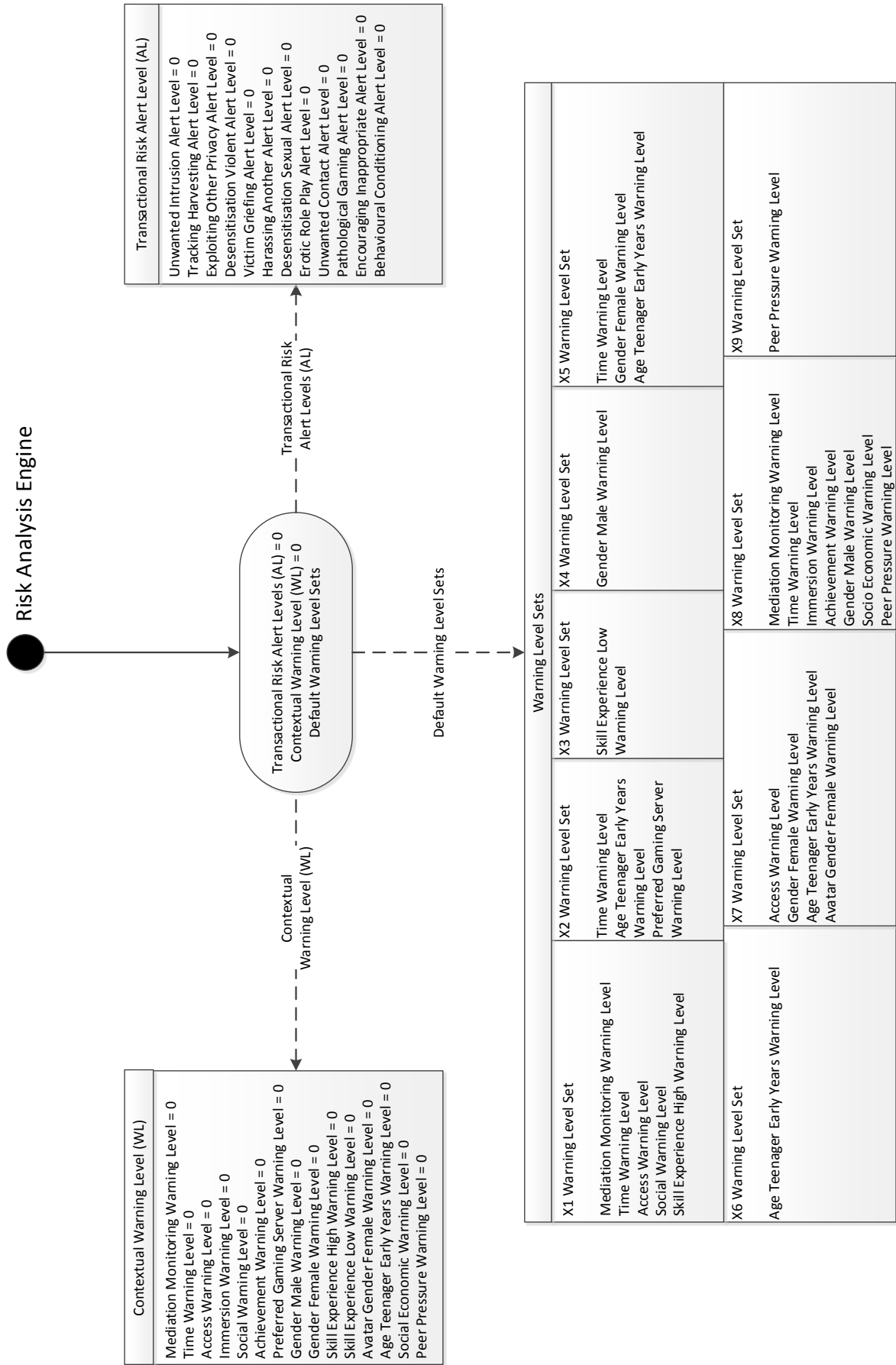
Figure 13 - Risk Analysis Engine (RAE)

Figures 17, 18 and 19 demonstrate the conceptual design in terms of the contextual influences components and the computational weightings attached thereto.
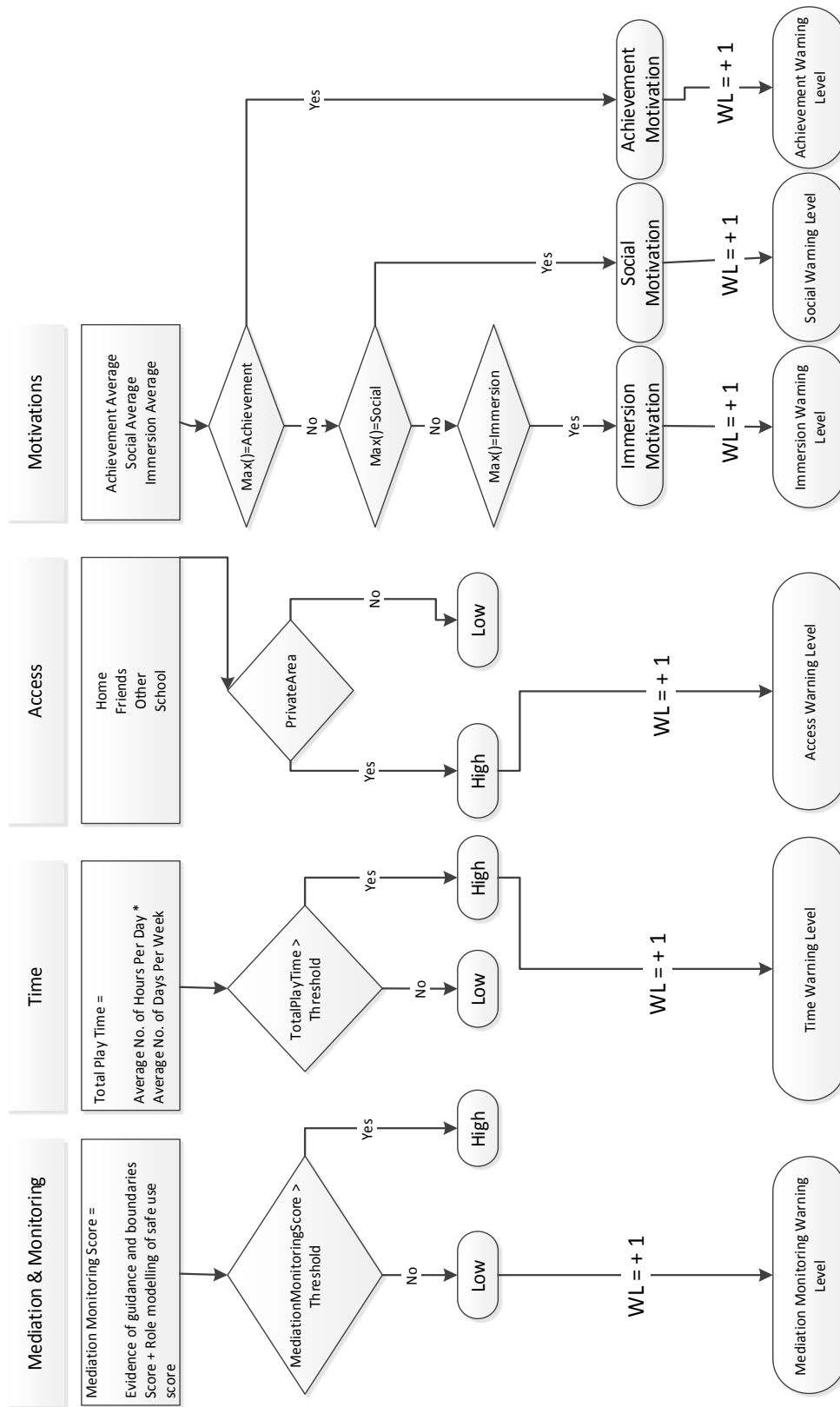
Figure 14 - Contextual Influences 1

Contextual Influences (2)

Avatar Characteristics

Male Avatar
Female Avatar

IF Gender Response = Female
- No → Low
- Yes → High

High → WL = +1 → Avatar Gender Female Warning Level

Skill Level Experience Total =

SkillScore+
LevelScore +
ExperienceScore

SkillLevelExperienceTotal > Threshold
- Low → Low → WL = +1 → Skill Experience Low Warning Level
- High → High → WL = +1 → Skill Experience High Warning Level

Gender

Male
Female

Gender Response
- Female → WL = +1 → Gender Female Warning Level
- Male → WL = +1 → Gender Male Warning Level

Preferred Gaming Server

PvP No Restrictions
PvP Some Restrictions
PvE Some Restrictions
PvE Full Restrictions
RP-PvP
RP-PvE

IF Gaming Server Response = PvP No OR PvP Some OR PvE Some
- No → Low
- Yes → High → WL = +1 → Preferred Gaming Server Warning Level

Figure 15 - Contextual Influences 2

Contextual Influences (3)

Peer Pressure

Peer Pressure Score → PeerPressureScore > Threshold
- Yes → High
- No → Low

WL = + 1 → Peer Pressure Warning Level

Socio Economic Status

Employed
Unemployed
Student
Retired
Disabled
Home or Family

IF SES Response = Student OR Unemployed
- No → Low
- Yes → High

WL = + 1 → Social Economic Warning Level

Age

Age → Age>5 and Age<13
- No → Age>13 and Age<18
  - No → Age>18 and Age<20
    - Young Adult → Young Adult
  - Teenage → Teenage
- Early Years → Early Years

WL = + 1 → Age Teenager Early Years Warning Level

Figure 16 - Contextual Influences 3

Figures 20 to 27 demonstrate how the Alert Levels are calculated for the transactional risks defined within the novel taxonomy. Each transactional risk utilises valid and reliable quantitative scales to provide a risk indication output.
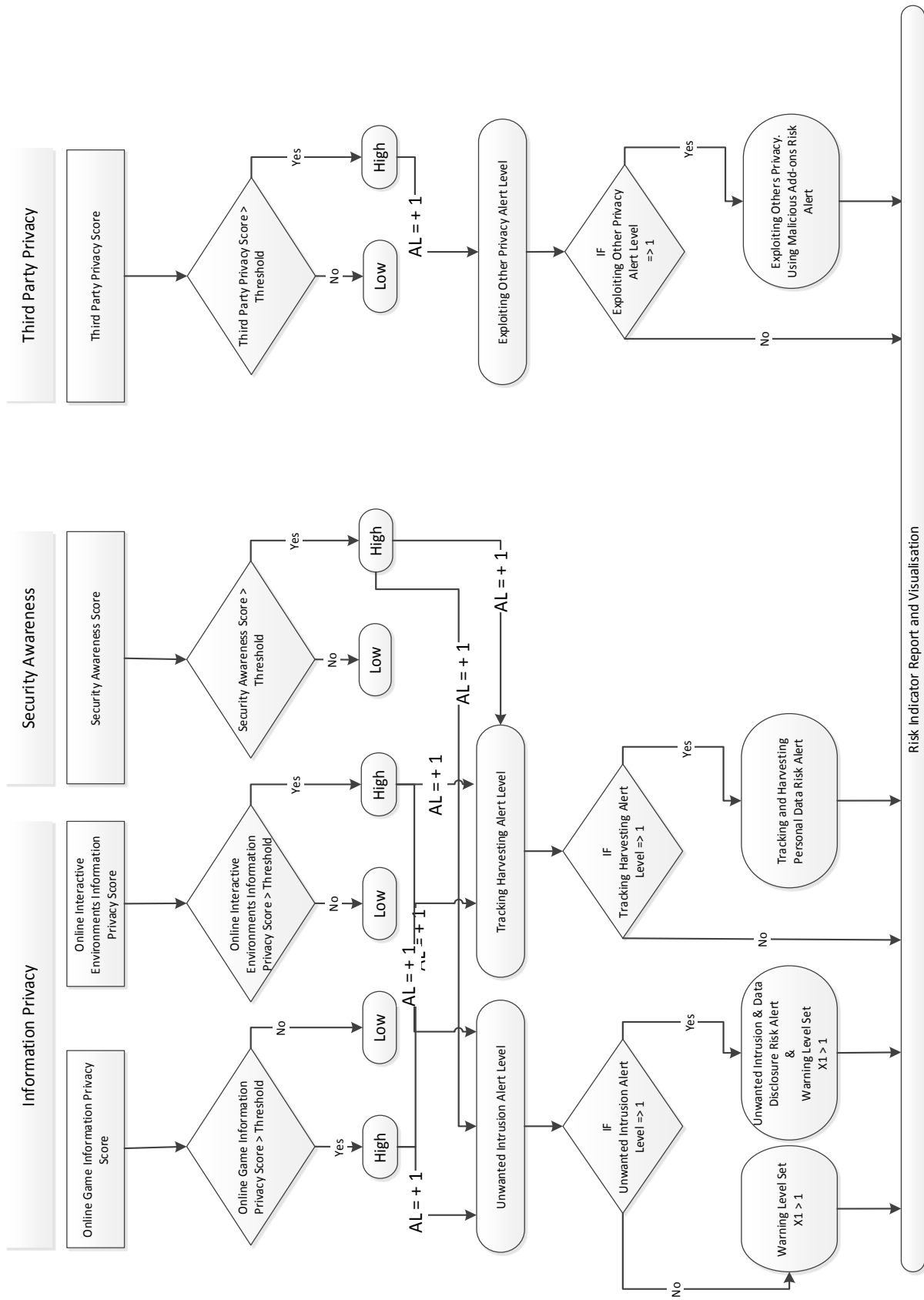
Figure 17 - Risk Alerts 1
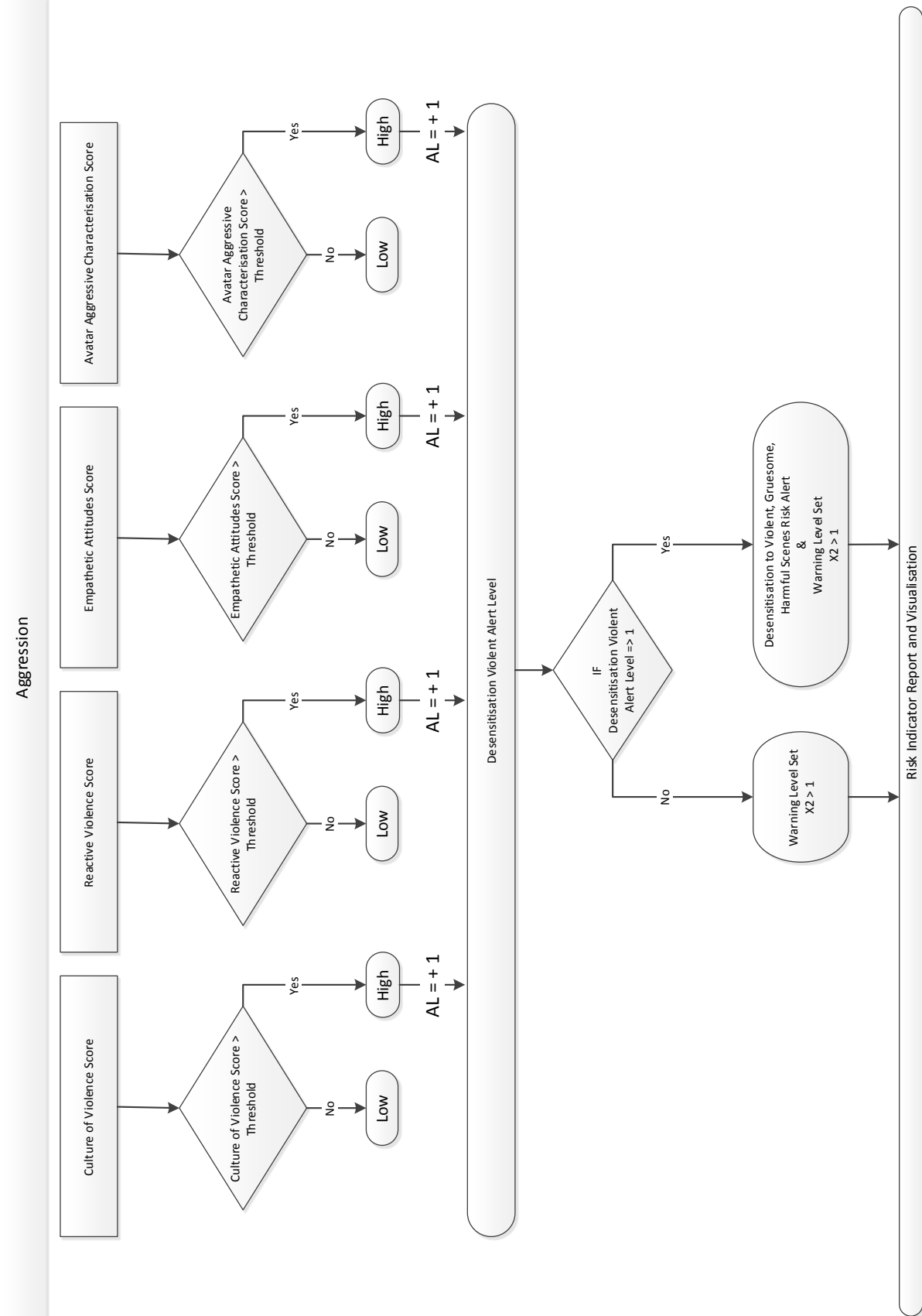
Figure 18 - Risk Alerts 2

Figure 19- Risk Alerts 3

Griefing, Trolling & Cyberbullying (2)

Griefing Perpetrator Score

Trolling Perpetrator Score

Cyberbullying Perpetrator Score

Griefing Perpetrator Score > Threshold

Trolling Perpetrator Score > Threshold

Cyberbullying Perpetrator Score > Threshold

Yes → High   AL = + 1

No → Low

Harassing Another Alert Level

IF Harassing Another Alert Level => 1

Yes → Harassing, Cyberbullying Another Risk Alert & Warning Level Set X4 > 1

No → Warning Level Set X4 > 1

Risk Indicator Report and Visualisation

Figure 20 - Risk Alerts 4

272

Figure 21 - Risk Alerts 5

273
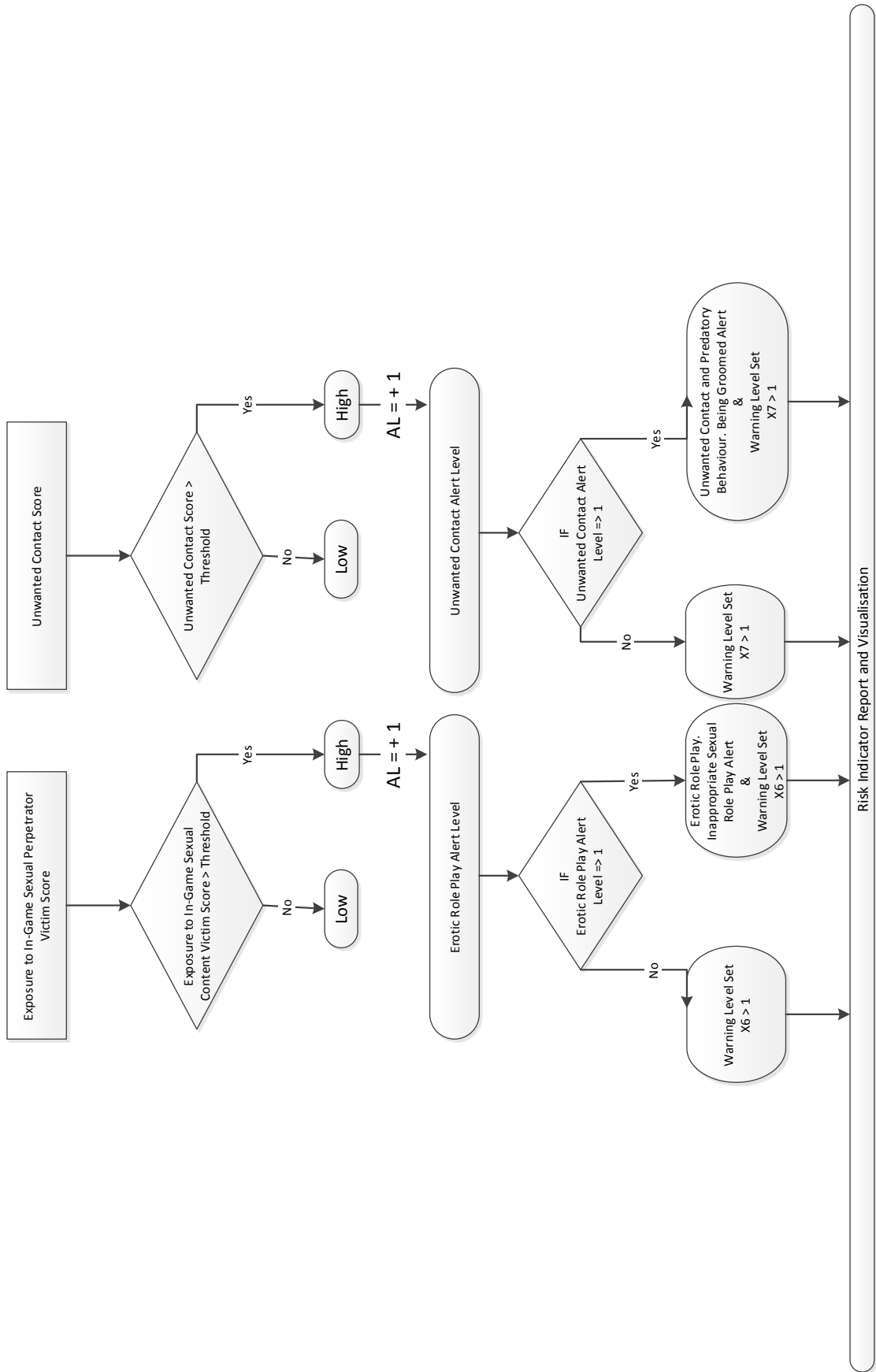
Figure 22 - Risk Alerts 6
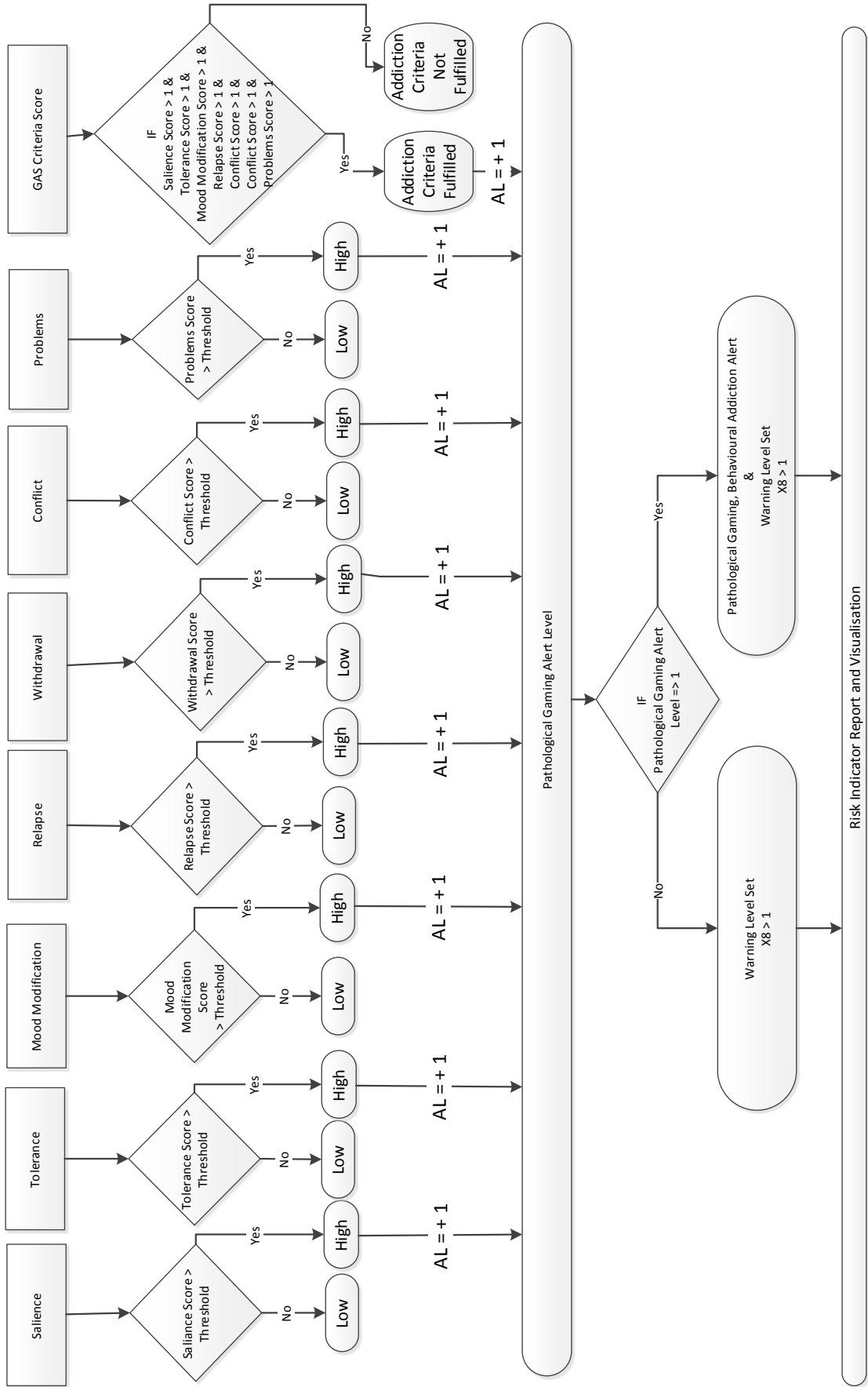
Figure 23 - Risk Alerts 7
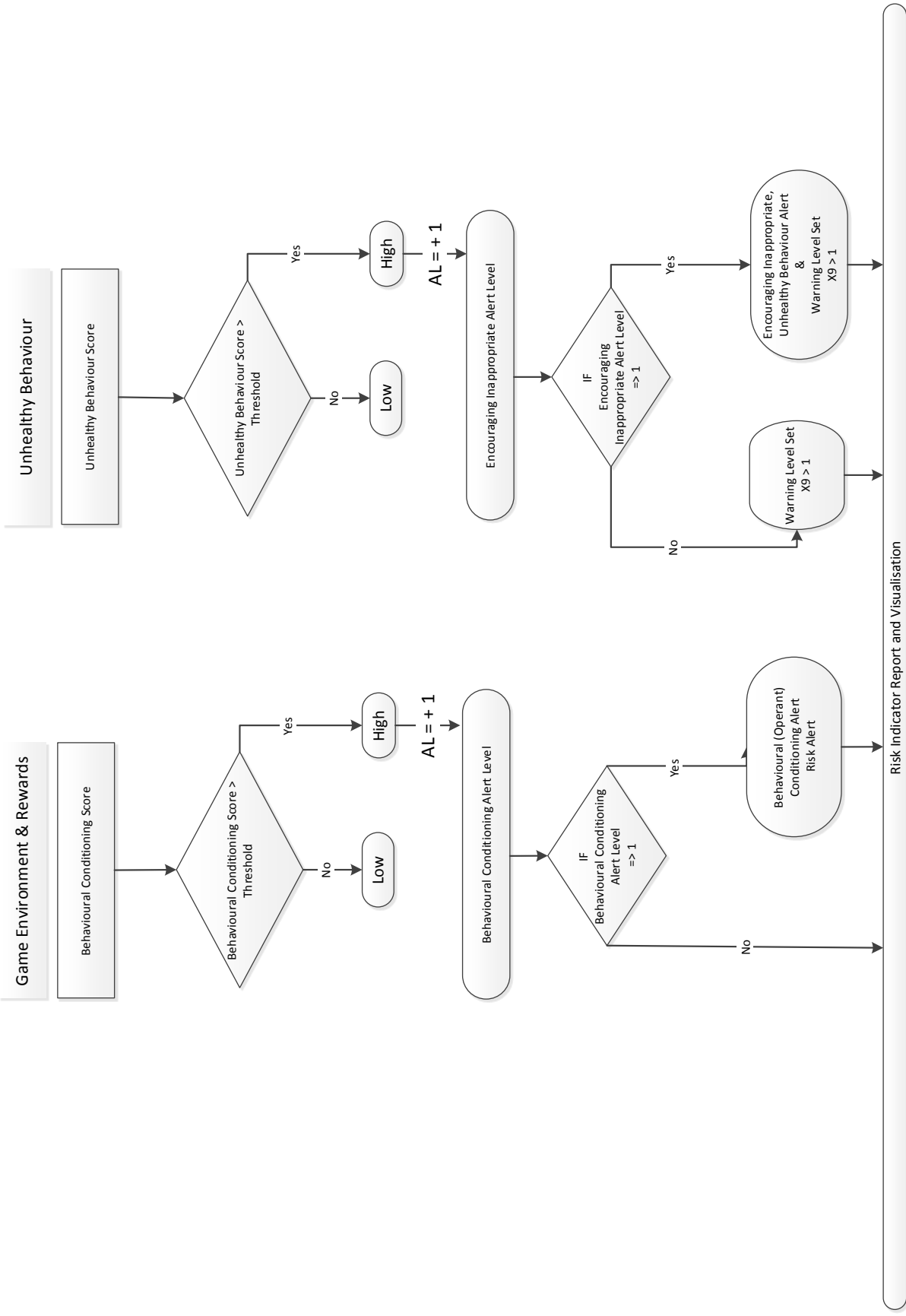
Figure 24 - Risk Alerts 8

7.4.7. Conclusion

The succeeding section discusses the implementation of a prototype proof-of-concept Decision Support System that is suitable for measuring the risks highlighted in previous chapters. The conceptual framework, architecture and Risk Analysis Engine (RAE) were presented to demonstrate how the research findings could be incorporated into a novel Decision Support System tool that supports the assessment of risk in MMORPGs.

7.5. Prototype Proof-of-Concept Implementation

The final objective of the research was to design and evaluate a prototype decision support system to assess risk to vulnerable individuals in online gaming environments. The prototype is based upon the risks identified and put forward in the abovementioned taxonomy.

The design of the prototype decision support system is based on the contextual influences map and runs in Microsoft Office Excel. The functions of the prototype support tool are presented and explained below. It is worth noting here that the software is not a fully developed program, but rather a prototype to demonstrate the concept of how a decision support system could be used in the assessment and mitigation of risks in online gaming environments.

The prototype incorporates assessment scales to provide a level of risk indication for a particular individual. The assessment scales were either taken from empirical studies designed and validated by other researchers or compiled by the author based on empirical research conducted throughout the aforementioned research programme. The prototype

incorporates a risk analysis engine that outputs risk indicators based on set risk levels. The risk levels can be adjusted by the user which in turn affects the level of risk reported. This feature is explained further in later in this chapter.

7.5.1 Control Panel

The control panel (figure 28) is essentially the main user interface of the prototype. At the top of the interface the current child record shown. Immediately below are three buttons, namely: Add a Child, Select Child and Control Risk Levels. The Add Child function enables the addition of a new profile record. Select Child enables the user to load a different profile record of a child that has previously or partially been assessed. The Control Risk Levels function enables the user to set the risk level thresholds.
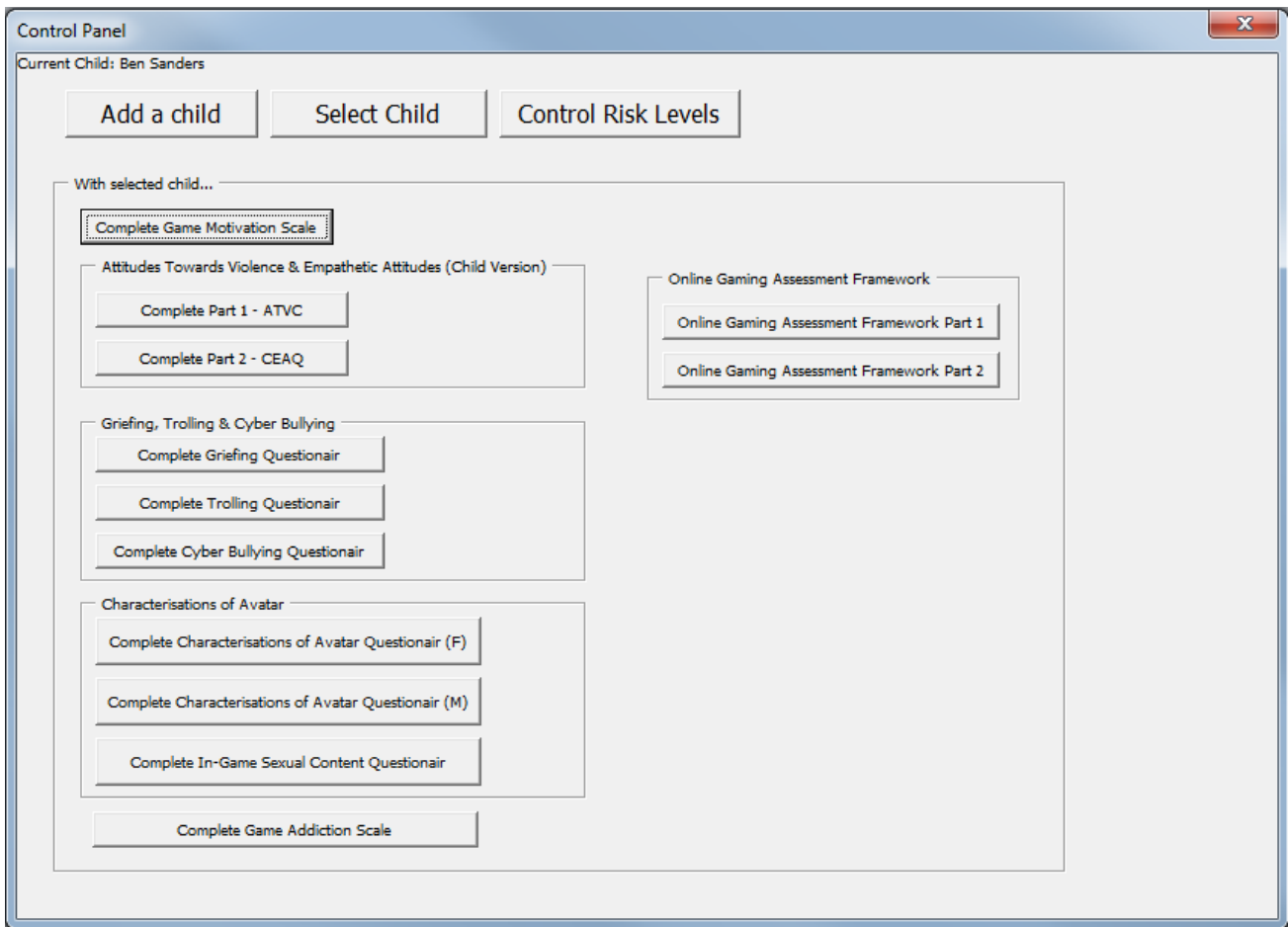
Figure 25 - Control Panel

7.5.2 Add a Child

The Add a Child (figure 29) input form enables the user to create a new entry of an individual for assessment. The particulars of the child are entered (i.e. Name, age, date of birth, gender and social economic status) as well as a number of contextual variables. (i.e. preferred gaming server, playing area and time spent playing online games). In addition, an overall score is given to two key contextual variables, namely Evidence of Guidance and Boundaries and Role Modelling of Safe Use; the scores of which would be based on a discussion with both a parent and the individual under assessment.

279

Once the information is entered, the user can either select 'Save', thereby creating a new record and saving the individuals profile or select 'Cancel', thereby returning to the control panel without saving the record.

Figure 26 - Add New Child

7.5.3 Select Child

The Select Child (figure 30) interface displays records of all individuals that are currently in the database. The user highlights the individual for assessment and selects either 'Select this child', thereby opening the profile record for that individual or 'Cancel' to revert to the control panel.
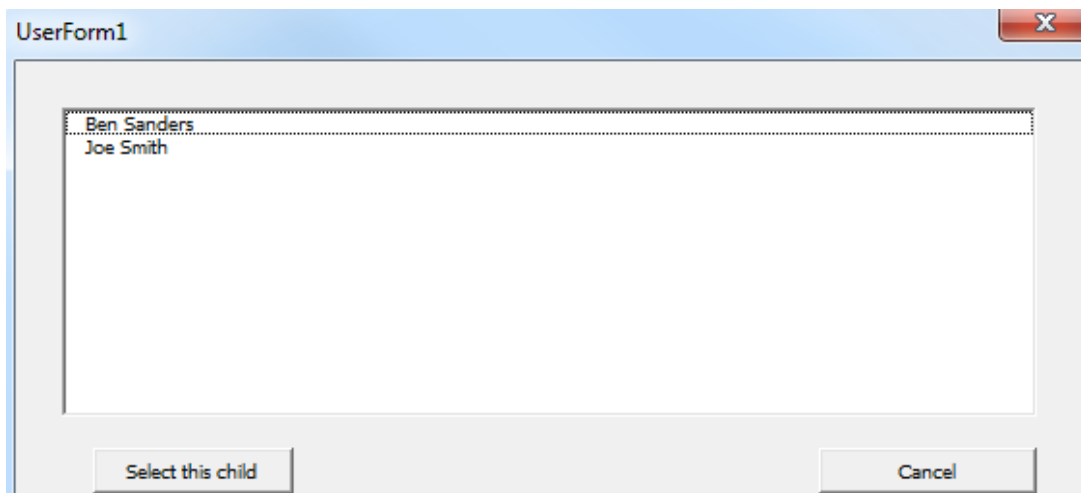
Figure 27 - Select Child

7.5.4 Control Risk Levels

The Control Risk Levels interface enables the user to set the risk level thresholds for each and every scoring system in the prototype. Risk levels are set using the sliding scales, thereby providing the user with the ability to use their own professional judgement when determining risk. The risk level threshold settings would initially be informed through a combination of policies, training and critical review of a pilot system. It would be essential that a standard be imposed across all assessment systems and regularly reviewed in order to maintain consistency in risk indications.
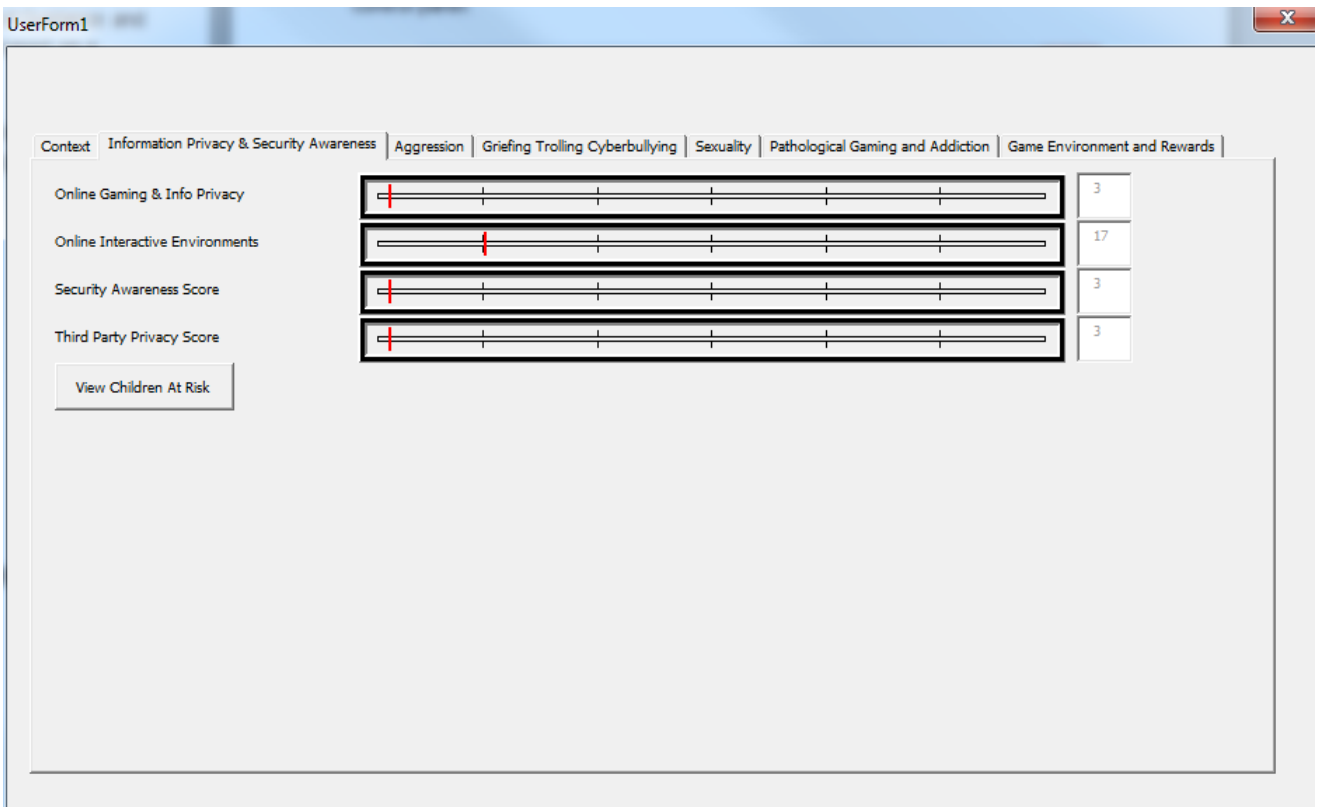
Figure 28 - Control Risk Levels

The 'View Children at Risk' (figures 32) function demonstrates the potential of the prototype in reporting individuals at risk. This concept is discussed in further detail later in this chapter.
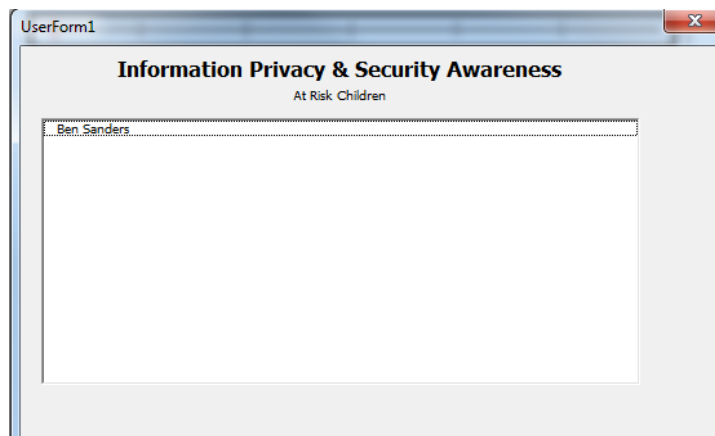
Figure 29 - Children at Risk

7.5.5 Game Motivation Scale

The Online Gaming Motivation Scale is a quantitative assessment scale (Yee, 2012) specifically designed and validated to understand gamers motivations for playing Massively Multiplayer Online Role Playing Games. Yee (2012) proposed a taxonomy of player motivations underpinned by the aforementioned motivation scale.

The Game Motivation Scale interface presents the user with the above mentioned motivation scale together with the Motivation Taxonomy displayed in the bottom right hand corner. As the user completes the motivation scale assessment, the respective scores are automatically computed into the taxonomy table. Totals are summed for each category together with the mean average, thereby giving an overall indication of the individual's main motivation (i.e. Achievement, Social, and Immersion). A coloured indicator informs the user when each question has been answered and the 'Save data' button is enabled.

Game Motivation Scale (GAS)

Score the questions below using the scale on the right

1-Not Important/Interesting/Often
2-Slightly Important/Interesting/Often
3-Moderately Important/Interesting/Often
4-Very Important/Interesting/Often
5-Extremely Important/Interesting/Often

Levelling up your character as fast as possible. ○1 ●2 ○3 ○4 ○5

Acquiring rare items that most players will never have. ○1 ○2 ●3 ○4 ○5

Becoming powerful. ○1 ○2 ●3 ○4 ○5

Accumulating resources, items or money. ○1 ○2 ●3 ○4 ○5

How important is it to you to be well known in the game? ○1 ●2 ○3 ○4 ○5

Being part of a serious, raid/loot-orientated guild. ○1 ○2 ●3 ○4 ○5

How interested are you in the precise numbers and percentages underlying the game mechanics? ○1 ○2 ●3 ○4 ○5

How important is it to you that your character is optimised as possible for their profession/role? ○1 ●2 ○3 ○4 ○5

How often do you use a character builder or a template to plan out your character's advancement at an early level? ○1 ○2 ●3 ○4 ○5

Knowing as much about the game mechanics and rules as possible. ○1 ●2 ○3 ○4 ○5

Competing with other players. ○1 ○2 ●3 ○4 ○5

How often do you purposefully try to provoke or irritate other players? ○1 ○2 ●3 ○4 ○5

Dominating/killing other players. ○1 ●2 ○3 ○4 ○5

Doing things to that annoy other players. ○1 ○2 ●3 ○4 ○5

Getting to know other players. ○1 ●2 ○3 ○4 ○5

Helping other players. ○1 ○2 ○3 ○4 ●5

Chatting with other players. ○1 ○2 ●3 ○4 ○5

Being part of a friendly, casual guild. ○1 ○2 ●3 ○4 ○5

How often do you find yourself having meaningful conversations with other players? ○1 ○2 ●3 ○4 ○5

How often do you talk to your online friends about your personal issues? ○1 ○2 ●3 ○4 ○5

How often have your online friends offered you support when you had a real life problem? ○1 ○2 ●3 ○4 ○5

Would you rather be grouped or soloing? ○1 ○2 ●3 ○4 ○5

How important is it to you that your ... ○1 ○2 ●3 ○4 ○5

How much do you enjoy working with ... ○1 ●2 ○3 ○4 ○5

Having a self-sufficient character. ○1 ○2 ●3 ○4 ○5

How much do you enjoy exploring the world just for the sake of exploring it? ○1 ●2 ○3 ○4 ○5

How much do you enjoy finding quests, non-player characters or locations that most people do not know about? ○1 ○2 ●3 ○4 ○5

How much do you enjoy collecting distinctive objects or clothing that has no functional value in the game? ○1 ○2 ●3 ○4 ○5

Exploring every map or zone in the world. ○1 ●2 ○3 ○4 ○5

Trying out new roles and personalities with ... ○1 ○2 ●3 ○4 ○5

Being immersed in a fantasy world. ○1 ●2 ○3 ○4 ○5

How often do you make up stories and histories for your characters? ○1 ○2 ○3 ●4 ○5

How often do you role-play your character? ●1 ○2 ○3 ○4 ○5

How much time do you spend customising your character during character ... ○1 ●2 ○3 ○4 ○5

How important is it to you that your character's armour/outfit matches in colour and style? ○1 ○2 ●3 ○4 ○5

How important is it to you that your character looks different from other characters? ○1 ○2 ●3 ○4 ○5

How often do you play so you can avoid thinking about some of your real-life ○1 ●2 ○3 ○4 ○5

How often do you play to relax from the day's school/work? ○1 ●2 ○3 ○4 ○5

Escaping from the world. ○1 ○2 ●3 ○4 ○5

Motivation Taxonomy Complete

Achievement	Score	Social	Score	Immersion	Score
Advancement Questions 1-6	16	Socialising Questions 15-18	13	Discovery Questions 26-29	10
Mechanics Questions 7-10	10	Relationship Questions 19-21	9	Role-Playing Questions 30-33	10
Competition Questions 11-14	11	Teamwork Questions 22-25	11	Customisation Questions 34-36	8
				Escapism Questions 37-39	7
Achievement Total	37/70	Social Total	33/55	Immersion Total	35/70
Achievement Mean Average (Achievement total / 14)	2.6428 57142 85714	Social Mean Average (Social total /14)	3	Immersion Mean Average (Immersion total /14)	2.5

Scoring

A.   Sum together the scores for each motivation sub-category (i.e. advancement, mechanics, competition) and write the summed totals in the corresponding boxes

B.   Sum together the scores for each motivation category and write the total in the motivation total boxes (i.e. achievement total, social total and immersion total)

C.   Calculate the mean average for each motivation category and write the average score in the mean average boxes (i.e. achievement mean average, social mean average and immersion mean average)

Save data

Figure 30 - Game Motivation Scale

7.5.6 Attitudes Towards Violence Questionnaire (Child Version)

The Attitudes Towards Violence questionnaire (Funk et al, 2004) was designed to measure two facets of an a young person's attitude to violence, namely; Reactive Violence (violence in response to a perceived or actual threat) and Culture of Violence (a pervasive view that violence is acceptable and valued behavioural choice). The Part 1 – ATVC (figure 34) user interface provides the user with the means to undertake an assessment on an individual's attitude to violence. The scores for each item are automatically summed to give an overall

score in the ATVC table shown in the bottom right hand corner. A coloured indicator informs the user when each question has been answered and the 'Save data' button is enabled.

Figure 31 - Attitudes Towards Violence Questionnaire

7.5.7 Empathetic Attitudes Questionnaire (Child Version)

The Child's Empathetic Attitudes Questionnaire (CEAQ) (Funk, 2008) was designed to measure empathetic responses in young people. Indeed, empathic responding is implicated in antisocial behaviours such as bullying, sexual offending and violent crime and as such the aforementioned valid and reliable scale was designed to provide a means of intervention address this problem. The Part 2 – CEAQ (figure 35) user interface provides the user with the

means to undertake an assessment on an individual's empathic attitudes. The scores for each item are automatically summed to give an overall score in the CEAQ table shown in the bottom right hand corner. A coloured indicator informs the user when each question has been answered and the 'Save data' button is enabled.

Figure 32 - Empathetic Attitudes Questionnaire

7.5.8 Griefing Questionnaire

Griefing is the term given to a gamer who deliberately irritates and harasses other players within the game, using aspects of the game in unintended ways. A griefer derives pleasure primarily or exclusively from the act of annoying other users, and as such is a particular nuisance in online gaming communities.

286

The Griefing Questionnaire (figure 36) is designed to measure an individual's experience of griefing. The inventory items were compiled based on the research findings and the scale was tested for validity and reliability. Responses are categorised into three columns, namely; Witness (the degree to which the individual has witnessed such behaviour), Victim (the degree to which the individual has been a direct victim of such behaviour) and Perpetrator (the degree to which the individual has expressed this type of behaviour to others). The Griefing questionnaire interface provides the user with the means to assess the aforementioned behaviours. The scores for each item are automatically summed to give an overall score in the table shown in the bottom right hand corner. A coloured indicator informs the user when each question has been answered and the 'Save data' button is enabled.

Griefing Questionnaire

[Question: Thinking about your online gaming experience, how often have you either witnessed, been a victim of, or been a perpetrator of the following types of griefing?]

Score the questions on the left using the scale on the right

0 - Never
1 - Sometimes
2 - Always

Inventory Item	Witness (Content)	Victim (Contact)	Perpetrator (Conduct)	Inventory Item	Witness (Content)	Victim (Contact)	Perpetrator (Conduct)
A - Verbal Harassment	0 1 2	0 1 2	0 1 2	K - Preying on new players	0 1 2	0 1 2	0 1 2
B - Spamming	0 1 2	0 1 2	0 1 2	L - Scamming	0 1 2	0 1 2	0 1 2
C - Kill Stealing	0 1 2	0 1 2	0 1 2	M - Team Disruption	0 1 2	0 1 2	0 1 2
D - Ninja Looting	0 1 2	0 1 2	0 1 2	N - Event Disruption	0 1 2	0 1 2	0 1 2
E - Player Killing / Ganking	0 1 2	0 1 2	0 1 2	O - Role Play Disruption	0 1 2	0 1 2	0 1 2
F - Corpse / Spawn Camping	0 1 2	0 1 2	0 1 2	P - False Accusations	0 1 2	0 1 2	0 1 2
G - Mob Camping	0 1 2	0 1 2	0 1 2				
H - Mob Lurking / Training	0 1 2	0 1 2	0 1 2				
I - Player Blocking	0 1 2	0 1 2	0 1 2				
J - Exploiting Loopholes	0 1 2	0 1 2	0 1 2				

Witness (Content)	Victim (Contact)	Perpetrator (Conduct)
0 / 32	0 / 32	0 / 32

Incomplete

Save Data

Figure 33 - Griefing Questionnaire

7.5.9 Trolling Questionnaire

Trolling refers to any internet user behaviour that is mean to intentionally anger or frustrate someone else in order to provoke a response. A troll is typically classified as someone who starts arguments or upsets others by posting inflammatory, extraneous or off-topic comments or messages.

The Trolling Questionnaire (figure 37) is designed to measure an individual's experience of trolling. The inventory items were compiled based on the research findings and the scale was tested for validity and reliability. Responses are categorised into three columns, namely;

Witness (the degree to which the individual has witnessed such behaviour), Victim (the degree to which the individual has been a direct victim of such behaviour) and Perpetrator (the degree to which the individual has expressed this type of behaviour to others). The Trolling questionnaire interface provides the user with the means to assess the aforementioned behaviours. The scores for each item are automatically summed to give an overall score in the table shown in the bottom right hand corner. A coloured indicator informs the user when each question has been answered and the 'Save data' button is enabled.

Figure 34 - Trolling Questionnaire

7.5.10 Cyberbullying Questionnaire

The Cyberbullying Questionnaire (figure 38) is designed to measure an individual's experience of cyberbullying. The inventory items were compiled based on the research findings and the scale was tested for validity and reliability. Responses are categorised into three columns, namely; Witness (the degree to which the individual has witnessed such behaviour), Victim (the degree to which the individual has been a direct victim of such behaviour) and Perpetrator (the degree to which the individual has expressed this type of behaviour to others). The Cyberbullying questionnaire interface provides the user with the means to assess the aforementioned behaviours. The scores for each item are automatically summed to give an overall score in the table shown in the bottom right hand corner. A coloured indicator informs the user when each question has been answered and the 'Save data' button is enabled.

Cyber Bullying Questionnaire

[Question: Thinking about your online gaming experience, how often have you either witnessed, been a victim of, or been a perpetrator of the following types of cyber bullying?]

Score the questions on the left using the scale on the right

0 - Never
1 - Sometimes
2 - Always

Inventory Item	Witness (Content)	Victim (Contact)	Perpetrator (Conduct)
A - Harassment	0 1 2	0 1 2	0 1 2
B - Cyber stalking	0 1 2	0 1 2	0 1 2
C - False malicious rumours	0 1 2	0 1 2	0 1 2
D - Embarrassment	0 1 2	0 1 2	0 1 2
E - Impersonation	0 1 2	0 1 2	0 1 2
F - Exclusion	0 1 2	0 1 2	0 1 2
G - Intimidation	0 1 2	0 1 2	0 1 2
H - Disclosure of personal sensitive information	0 1 2	0 1 2	0 1 2

Witness (Content)	Victim (Contact)	Perpetrator (Conduct)
0 / 16	0 / 16	0 / 16

Incomplete

Save Data

Figure 35 - Cyberbullying Questionnaire

7.5.11 Characterisations of Male and Female Avatars Questionnaire

Players can create one or one or more visual representations of themselves known as avatars which enable them to experiment and explore different identities (e.g. gender, weapons and class). Avatars hold different sets of professions and roles that the online game provides and the permanence and fluidity of roles varies depending on the design of the environment.

The Characterisations of Avatar questionnaire (figure 39) – Part 1, is designed to measure an individual's attitude towards the appearance of other avatars. Broad categories have been defined, enabling the user to input responses into the appropriate categories. When a comma is inserted between words the scores are incremented by +1.

Figure 36 - Characterisations of Avatar Questionnaire

7.5.12 In-Game Sexual Content Questionnaire

The Exposure to In-Game Sexual Content Questionnaire is designed to measure an individual's experience and exposure to sexual content. The inventory items were compiled based on the research findings and the scale was tested for validity and reliability. Responses are categorised into three columns, namely; Witness (the degree to which the individual has

witnessed such behaviour), Victim (the degree to which the individual has been a direct victim of such behaviour) and Perpetrator (the degree to which the individual has expressed this type of behaviour to others).   The Exposure to In-Game Sexual Content Questionnaire interface provides the user with the means to assess the aforementioned behaviours. The scores for each item are automatically summed to give an overall score in the table shown in the bottom right hand corner. A coloured indicator informs the user when each question has been answered and the 'Save data' button is enabled.

Figure 37 - In-Game Sexual Content Questionnaire

7.5.13 Pathological Game Addiction Scale

The Game Addiction Scale (Lemmens, 2009) is a valid and reliable scale designed to measure addiction to online games in adolescents. The scale builds upon the 7-point diagnostic criteria for behavioural addiction, namely; salience, mood modification, tolerance, withdrawal symptoms, conflict, problems and relapse. If an individual presents signs of each of the aforementioned criteria, they can be classified as behaviourally addicted.

The Game Addiction Scale user interface provides the user with the means to undertake an assessment on an individual's behavioural addiction to games. The scores for each item are automatically summed to give an overall score in the in table shown in the bottom right hand corner. A coloured indicator informs the user when each question has been answered and the 'Save data' button is enabled.

UserForm1

Pathological Game Addiction Scale
[Question: Thinking about your online gaming experience, how often...]

Score the questions below using the scale on the right

0-Never
1-Rarely
2-Sometimes
3-Often
4-Very often

Inventory Item		Inventory Item	
A| Did you think about playing a game all day long?	0 1 2 3 4	O| Have you felt addicted to a game?	0 1 2 3 4
B| Did you play longer than intended?	0 1 2 3 4	P| Were you unable to stop once you started playing?	0 1 2 3 4
C| Did you play games to forget about real life?	0 1 2 3 4	Q| Have you played games to feel better?	0 1 2 3 4
D| Were you unable to reduce your game time?	0 1 2 3 4	R| Have you failed when trying to reduce game time?	0 1 2 3 4
E| Have you felt bad when you were unable to play?	0 1 2 3 4	S| Have you become stressed when unable to play?	0 1 2 3 4
F| Did you have fights with others (e.g., family, friends) over your time spent on games?	0 1 2 3 4	T| Have you lied about time spent on games?	0 1 2 3 4
G| Has your time on games caused sleep deprivation?	0 1 2 3 4	U| Did you feel bad after playing for a long time?	0 1 2 3 4
H| Did you spend much free time on games?	0 1 2 3 4		
I| Did you spend increasing amounts of time on games?	0 1 2 3 4		
J| Have you played games to release stress?	0 1 2 3 4		
K| Have others unsuccessfully tried to reduce your game use?	0 1 2 3 4		
L| Have you become angry when unable to play?	0 1 2 3 4		
M| Have you neglected others (e.g., family, friends) because you were playing games?	0 1 2 3 4		
N| Have you neglected other important activities (e.g., school, work, sports) to play games?*	0 1 2 3 4		

Incomplete

Salience		Tolerence		Mood Modification		Relapse		Withdrawal		Conflict		Problems	
A	0	B	0	C	0	D	0	E	0	F	0	G	0
H	0	I	0	J	0	K	0	L	0	M	0	N	0
O	0	P	0	Q	0	R	0	S	0	T	0	U	0
0 / 12		0 / 12		0 / 12		0 / 12		0 / 12		0 / 12		0 / 12	

Save Data

Figure 38 - Game Addiction Scale

7.5.14 Online Gaming Assessment Framework – Part 1

The Online Gaming Assessment Framework – Part 1 is designed to assess an individual's data disclosure and level of online security awareness in both online gaming environments and online interactive environments outside of the game. In addition, the individual's avatar skill, level and experience are scored.

The Online Gaming Assessment Framework – Part 1 user interface provides the user with the means to undertake an assessment on an individual's privacy risk and online security awareness. If the individual under assessment reports disclosing certain data types and/or

answers 'Yes' to any of the online security awareness questions, the boxes are checked in the appropriate columns and a risk indicator is automatically generated.

Figure 39 - Online Gaming Assessment Framework - Part 1

7.5.15 Online Gaming Assessment Framework – Part 2

The Online Gaming Assessment Framework – Part 2 is designed to explore an individual's experience of unwanted contact, behavioural conditioning of unhealthy behaviour.

The Online Gaming Assessment Framework – Part 2 user interface provides the user with the means to undertake an assessment on an individual's experience of unwanted contact, behavioural conditioning of unhealthy behaviour.

The scores in the game environment and rewards scale are summed together and the individual's score meets the set threshold set in the Control Risk interface a risk indicator is generated.

The scores in the unhealthy behaviour scale are summed together and if the individual's score meets the set threshold set in the Control Risk interface a risk indicator is generated.

UserForm1

Unwanted Contact

[Question: Thinking about your online gaming experience, how often have you experience the following behaviors from other players?]

Inventory Item	Score based on 0 (Never), 1 (Sometimes), 2 (Always)
Received many gifts from one player	○ 0 ○ 1 ○ 2
Repeated and persistent protection or help from one player	○ 0 ○ 1 ○ 2
Repeated follow-up contact outside of the gaming world	○ 0 ○ 1 ○ 2
Requests for personal details (e.g. age, home address, email, telephone number)	○ 0 ○ 1 ○ 2
Requests for pictures	○ 0 ○ 1 ○ 2
Offering of pictures	○ 0 ○ 1 ○ 2
Information about where the gaming device is located in the home	○ 0 ○ 1 ○ 2
Requests to meet face-to-face in person	○ 0 ○ 1 ○ 2
Direct sexually orientated messages	○ 0 ○ 1 ○ 2

Incomplete

SAVE

Game Environment and Rewards

[Question: Thinking about the time from when you first started playing your favourite MMORPG to now]

Behavioural (Operant) Conditioning	Score based on 1 (Does not apply), 3 (Somewhat applies), 5 (Applies)
Each time I progress to the next level, the amount of time I have to spend playing increases	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
I do not know when I will receive the next 'reward' (weapon, skill, levelling up) in the game	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
I have spent a lot of my time to reach the current level in the game	○ 1 ○ 2 ○ 3 ○ 4 ○ 5

Unhealthy Behaviour

[Question: Thinking about the time from when you first started playing your favourite MMORPG to now]

Behavioural (Operant) Conditioning	Score based on 1 (Does not apply), 3 (Somewhat applies), 5 (Applies)
Encouraging/persuading other gamers to play for long periods of time (e.g. to complete a quest or raid)	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Encouraging/persuading other gamers to pressurise or harm a specific player	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Disregard real life responsibilities to play the game (i.e. meals, job/school work, family)	○ 1 ○ 2 ○ 3 ○ 4 ○ 5

Figure 40 - Online Gaming Assessment Framework - Part 2

7.6 Risk Assessment and Report Output

This prototype was designed to demonstrate how a Decision Support System might assist in the assessment and mitigation of risks identified to vulnerable individuals in online gaming environments.

The prototype uses a risk analysis engine to compute the scores of each risk assessment, comparing the individual scores to the thresholds set in the Control Risk user interface. When the user selects 'View Children at Risk', assessed individuals whose risk assessment scores exceed the thresholds are shown as 'at risk'.

The preceding sections demonstrate how the prototype's risk analysis engine assesses the scores inputted from the aforementioned risk assessment questionnaire. Having demonstrated the basic concept of the prototype decision support system, this section proposes a number of future developments.

7.6.1 Risk Indicator Report

Figure 44 presents a risk indicator report for an assessed individual. The Identified Risks section presents the risk taxonomy. The risk taxonomy displays red coloured boxes to illustrate the risks specific to the assessed individual.

Figure 45 illustrates how the prototype displays a breakdown report of the transactional risk when the user selects that risk in the taxonomy. In the example shown the user has selected the identified risk 'Victim of griefing, trolling, cyberbullying' and the prototype displays the

results of each of the scales used in the identification and determination of that transactional risk. Scale scores that exceed the thresholds defined in the Control Risk Level interface are highlighted in red, providing the user with an informed understanding of how that that risk was measured and identified.

7.6.2 Contextual Influences

The Contextual Influences section of the Risk Indicator Report presents a visualisation of the contextual influences on the transactional risks. In the example shown in Figure 45, two contextual influences (i.e. Mediation and Monitoring and Gender) are highlighted in red, indicating that the assessed individual has exceeded the thresholds defined in the Control Risk Level interface. Figure 46 illustrates how the prototype displays a breakdown report of the contextual influence when selected by the user. In the example shown the user selected the contextual influence 'Mediation and Monitoring' and the prototype displays the results of each of the scales used in the identification and determination of that contextual influence. Scale scores that exceed the thresholds defined in the Control Risk Level interface are highlighted in red, providing the user with an informed understanding of how that that risk was measured and identified.

6.5.3 Automatic Risk Alerts

Figures 45 and 46 present the automatic risk alert feature. The prototype enables the user to set the automatic risk alerts and response values with the Control Risk Level interface. If an assessed individual provides a response to a risk that matches or exceeds the threshold

set in the Control Risk Level interface then the Risk Indicator Report highlights the individual risks in the Automatic Risk Alert section. For example, in figures 17 and 18, the assessed individual has not been identified as at risk of 'Unwanted intrusion, data disclosure'. However, in the Automatic Risk Alerts section of the Risk Indicator Report, two automatic risk alerts are presented, namely; received requests for personal pictures and disclosed home address. Both of the aforementioned risks form part of the scoring scale for the 'Unwanted intrusion, data disclosure' transactional risk, shown in the risk taxonomy.

The purpose of the proposed Automatic Risk Alerts feature is to enable the user to identify potentially harmful individual risks that form part of the scaled assessment; thereby facilitating early intervention.

7.6.4 Assessors Notes

The Assessor Notes section is provided to display qualitative information recorded about the assessed individual. Indeed, it is proposed that text boxes are situated within each scale assessment interface to facilitate the recording of further relevant risk specific responses. The qualitative information captured would help inform decisions regarding the assessed individual. In addition, the qualitative information would be used to inform future development of the prototype software.

RISK INDICATOR REPORT

Surname: Sanders
Forename: Benjamin
Date of Birth: 02/06/1998
Age: 15 Years

Risks Taxonomy

	Content	Contact	Conduct
Information Privacy	Tracking & harvesting personal data	Unwanted intrusion, data disclosure	Exploiting others privacy. Using malicious add-ons
Aggression	Desensitisation to violent, gruesome, harmful scenes	Victim of griefing, trolling, cyberbullying	Harassing, cyberbullying another
Sexuality	Desensitisation to sexual scenes	Unwanted contact and predatory behaviour. Being groomed	Erotic role play. Inappropriate sexual conduct
Values & Beliefs	Behavioural (operant) conditioning	Pathological gaming, behavioural addiction	Encouraging inappropriate, unhealthy behaviour

Contextual Influences

Automatic Risk Alerts

Received requests for personal pictures
Disclosed home address

Assessors Notes

None recorded

Figure 41 - Risk Indicator Report

302

RISK INDICATOR REPORT

Surname: Sanders
Forename: Benjamin
Date of Birth: 02/06/1998
Age: 15 Years

Risks Taxonomy

	Content	Contact	Conduct
Information Privacy	Tracking & harvesting personal data	Unwanted intrusion, data disclosure	Exploiting others privacy. Using malicious add-ons
Aggression	Desensitisation to violent, gruesome, harmful scenes	Victim of griefing, trolling, cyberbullying	Harassing, cyberbullying another

Victim of griefing, trolling, cyberbullying

Griefing Assessment

Witness   22/32
Victim   13/32
Perpetrator   2/32

Trolling Assessment

Witness   4/6
Victim   5/6
Perpetrator 6/6

Cyber Bullying Assessment

Witness   4/8
Victim   2/8
Perpetrator 2/8

Access

Gender

Automatic Risk Alerts

Received requests for personal pictures
Disclosed home address

Assessors Notes

None recorded

Figure 42 - Risk Indicator Report - Breakdown of Transactional Risk

RISK INDICATOR REPORT

Surname: Sanders
Forename: Benjamin
Date of Birth: 02/06/1998
Age: 15 Years

Risks Taxonomy

	Content	Contact	Conduct
Information Privacy	Tracking & harvesting personal data	Unwanted intrusion, data disclosure	Exploiting others privacy. Using malicious add-ons
Aggression	Desensitisation to violent, gruesome, harmful scenes	Victim of griefing, trolling, cyberbullying	Harassing, cyberbullying another
Sexuality	Desensitisation to sexual scenes	Unwanted contact and predatory behaviour. Being groomed	Erotic role play. Inappropriate sexual conduct
Values & Beliefs	Behavioural (operant) conditioning	Pathological gaming, behavioural addiction	Encouraging inappropriate, unhealthy behaviour

Contextual Influences

Mediation & Monitoring

Evidence of guidance and boundaries	1/5
Role modelling of safe use	5/5

Automatic Risk Alerts

Received requests for personal pictures
Disclosed home address

Assessors Notes

None recorded

Figure 43 - Risk Indicator Report – Breakdown of Contextual Influence

304

7.7 Future Implementation Considerations

Whilst the aim of the proposed prototype decision support system was to demonstrate how such a piece of software could assist in the assessment and mitigation of risks in online gaming environments, a number of limitations and future implementation considerations are set out in this section.

7.7.1 Thresholds and Automatic Risk Alert Settings

The prototype demonstrates how the user is able to set the thresholds and automatic risk alerts, however, a key limitation with this approach is lack of consistency in the wider assessment process. Therefore, there would be a corresponding requirement for a standard setting based on policy and empirical evidence in order to ensure effective safeguarding of vulnerable individuals whilst minimising potential false positives.

7.7.2 Emerging Risks

It is commonly acknowledged that the management of risk, particularly in the online world is somewhat of a moving target and as such the prototype would need to provide a means of feedback to inform future development.

7.7.3 Data Storage

The prototype is designed to store data locally in an Excel spread sheet. Consideration would therefore need to be given to the secure storage of captured data.

7.7.4 Tracking Change in Future Assessments

The monitoring of change over time forms an integral part of any safeguarding process. The purpose of this prototype is to assist professionals in the assessment of vulnerable individuals who participate in online gaming environments. This prototype facilitates this assessment process; however, consideration would need to be given to the tracking of change in future assessments. Indeed, a means of comparison between assessments of a particular individual would enable the professional to monitor progress.

7.7.5 Conclusions

This section has outlined in more detail how the main features of the conceptual architecture have been implemented to facilitate a novel method of risk assessment in MMORPG environments. The user interfaces made use of the previously discussed scales to measure risks and output indications. Moreover, the visualisation of data is displayed within the taxonomy and both transactional risks and contextual warnings are visualised using both coloured indicators. The next stage is to explore how individuals and professional practitioners react to this software. Therefore, both individual users and professional social work practitioners were invited to participate in the evaluation of this prototype proof-of-concept. This evaluation is presented in the following section.

7.8 Exploratory Prototype Evaluation

This section discusses the methods used to undertake evaluation of the proof-of-concept prototype implementation. The findings are introduced and demonstrate how the prototype acts as a tool for risk assessment and reduction.

7.8.1 Introduction

Seymour (2002) states that it is important that representatives from the user populations remain a central element to the evaluation process. Indeed, involving respondents in such a fashion is already established and important aspect for both user-centered (Wagner, 2005) and participatory design (Bakardjieva, 2005). The prototype was a technical implementation by the author for addressing the issues of risk and potential consequences of harm in MMORPG environments.

7.8.2 Evaluation Method

The evaluation was an exploratory foray into how a Decision Support System might operate to assess and reduce risk in MMORPG environments. Participants did not use the software themselves, but were shown the key elements and features as set out above. Such demonstrations were to be the first steps in the evaluation process, allowing for findings to inform and influence the development of the prototype. Further refinement and user involvement could follow if the indications were positive. Therefore, there were no control

groups and no measures of the effect of the demonstrator upon the participants. Such factors would need to be addressed with further work.

The evaluation sought to combine an overall qualitative and quantitative approach. The preliminary states of the research relied upon gathering respondent's attitudes and beliefs. Quantitative analysis took the form of a Likert scale together with spaces for comments. The 5 point scale ranged from 1 not very helpful to 5 very helpful. The respondents were left to choose their own value of helpfulness from the range. The Likert scale was complied to direct attention to give structure and direct attention to the requirements of the prototype. As Bryman (2004) notes, Likert scales are one of the most common approaches to investigating attitudes towards specific concepts and it has also been identified as one of the most popular question formats for assessing usability (Dumas, 1999). The questionnaire is presented in Appendix A.

The prototype was tested with two different groups, namely, a group of 15 teenagers aged between 16 and 18 and a group of 15 social work practitioners who were responsible for the care of vulnerable individuals.

7.9 Findings

7.9.1 Overview

A total of 30 responses were collected in total. 15 respondents were teenagers aged between 16 and 18 with the remaining participants being social work practitioners responsible for the care of young and vulnerable people.

61% of respondents gave positive ratings for the software providing a ranking of over three. Furthermore, 22% of the respondents awarded the prototype a rating of five to indicate they thought it would be helpful. 14% of the teenager population felt that the prototype was not helpful at all, however, 64% of the social work practitioner demographic felt that the prototype would be a useful tool for the assessment of risk in a professional context.

7.9.2 Prototype Features

The first three questions sought to establish users' opinions on the Add Child, Select Child and Control Risk Levels functions. Figure 47 and 48 illustrates the findings:
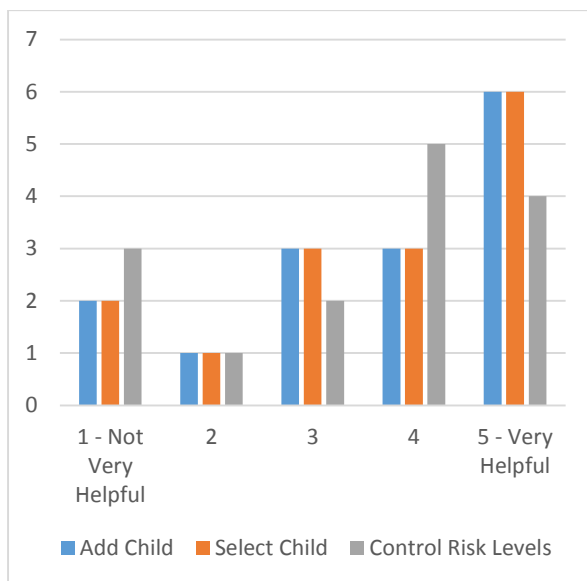
Figure 47 - Teenagers   Figure 48 - Social Work Practitioners
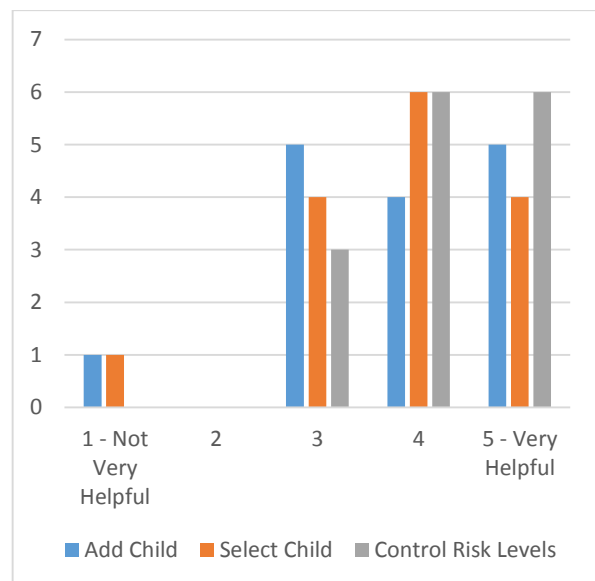
The findings illustrate that social work practitioners found the abovementioned features more useful that the teenager demographic. Qualitative comments from social work practitioners included "the functions are simple and the user interface is easy to navigate and

understand". Teenagers comments included "the add and select features are simple to use, but the control risk levels are difficult to understand".
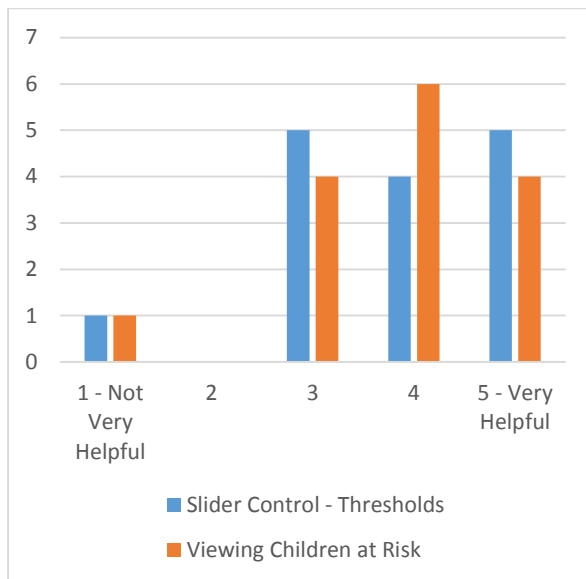
<div align="center">Figure 49 – Teenagers</div>
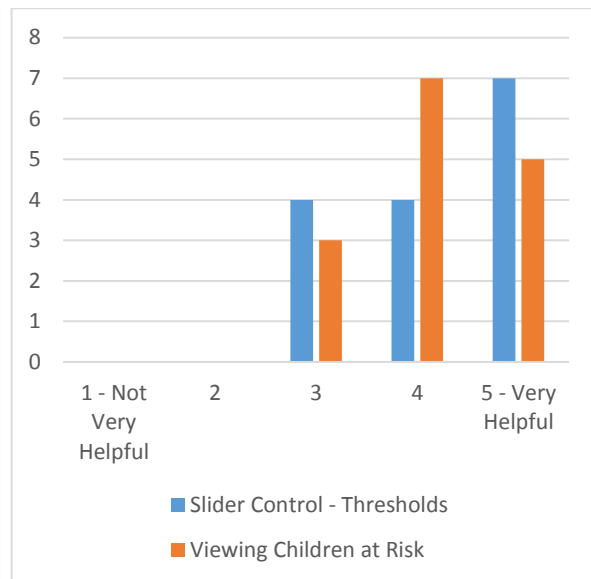
<div align="center">Figure 50 – Social Work Practitioners</div>

The findings show similar levels of acceptance of both the slider control and viewing individuals at risk functions. Qualitative feedback from social work practitioners reinforced the quantitative findings. Indeed, many of the social work practitioners echoed the view that as professionals, incorporating the flexibility to adjust threshold levels in accordance with new findings and guidance is a useful feature. Some raised concerns over the potential for error in threshold settings.

The view children (or vulnerable individuals) at risk was viewed differently by the two different test groups. The majority of the teenage respondents regarded this feature as not useful. In contrast, the majority of social work practitioners regarded the feature as particularly useful. Feedback from social work practitioners indicated that the feature was

considered useful for future development of the prototype and for the analysis of emerging trends.

Turning to the Game Motivation Scale and scoring matrices, both groups gave positive responses toward the need for valid and reliable measures. Social work practitioners made reference to the time required to complete longer questionnaires and the corresponding time burden.

Both groups responded positively to the incomplete/complete indicator in each of the questionnaires. Users from both test groups felt that the visual indicators were useful, particularly given the length of time required to undertake the assessments.

The risk indicator report aimed to provide visual and text risk indications based upon a participant's score measured against the pre-defined threshold settings. Findings demonstrate that both user groups found the output useful with users reported that the risk indicator report provided a rich output of identified risks.
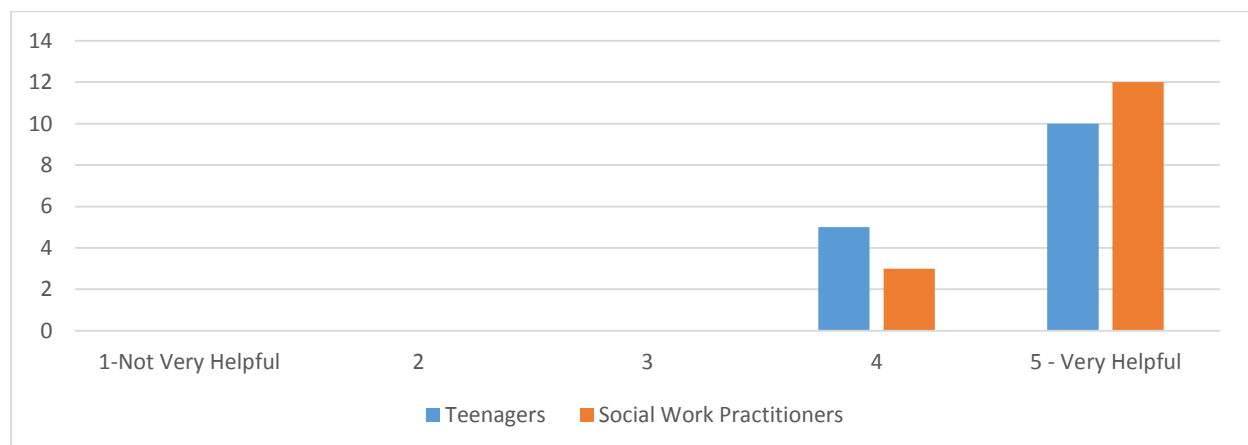
Figure 51 – Risk Indicator Report

Turning to the risks taxonomy, both user groups found this feature useful. In particular, feedback from social work practitioners was favourable. Furthermore, both groups recognised the value of the transactional risk breakdown report and red risk indicators contained within the taxonomy output.

The contextual influences visualisation and breakdown outputs received positive feedback from both user groups. Social work practitioners made reference to the usefulness of understanding the influences that contributed to the risk alerts.

Both groups provided quantitative scores of either 4 or 5 for the automatic risk alerts output feature. Turning to the assessors notes section, this feature was generally not classified as useful among the teenage population, however, the social work practitioner respondents felt this feature was important in the design to capture further context.

The second section of the evaluation processes asked participants to rate the overall system in terms of overall usability. The findings are illustrated below:
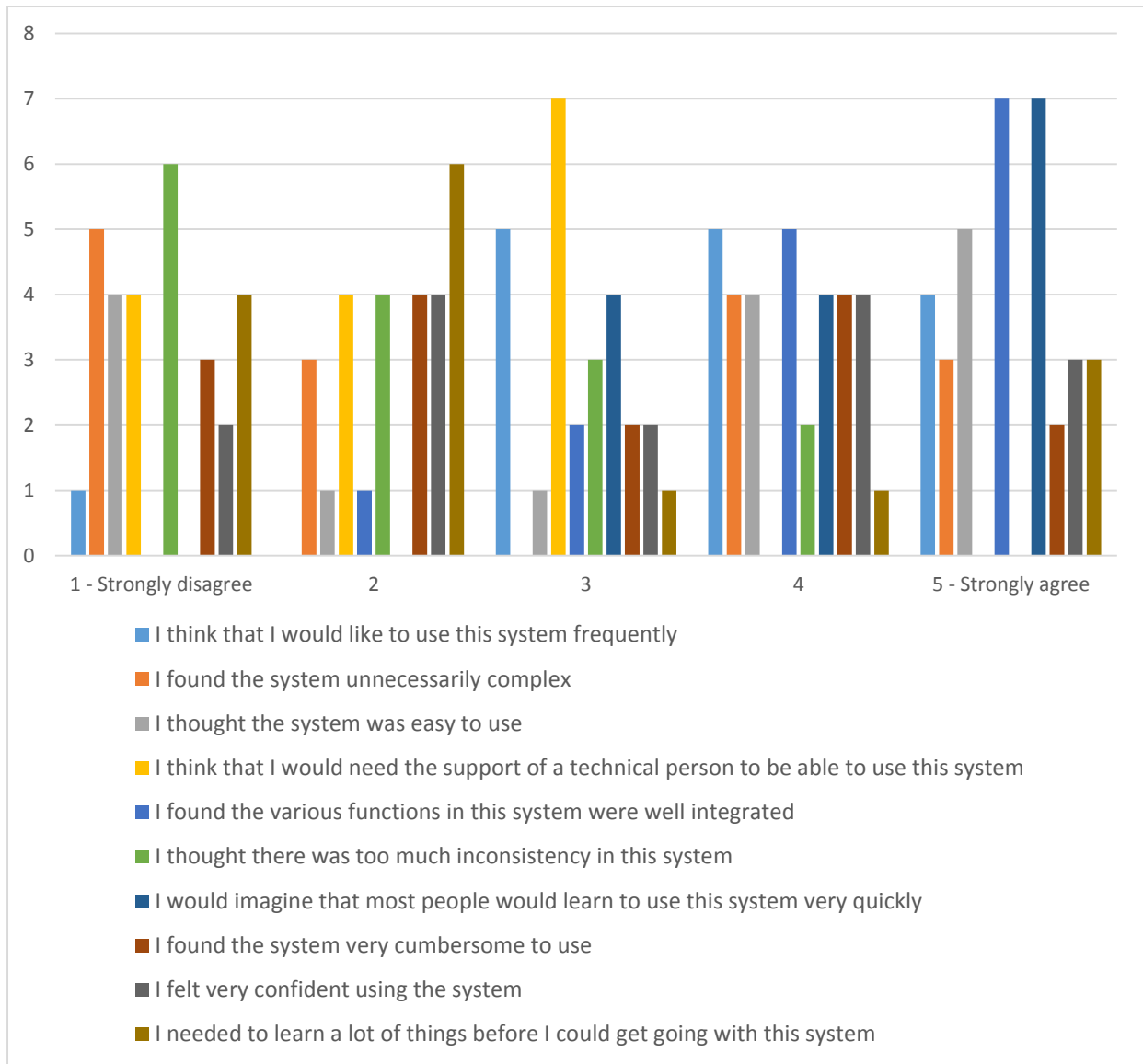
Figure 52 – Overall Usability Ratings – Teenagers
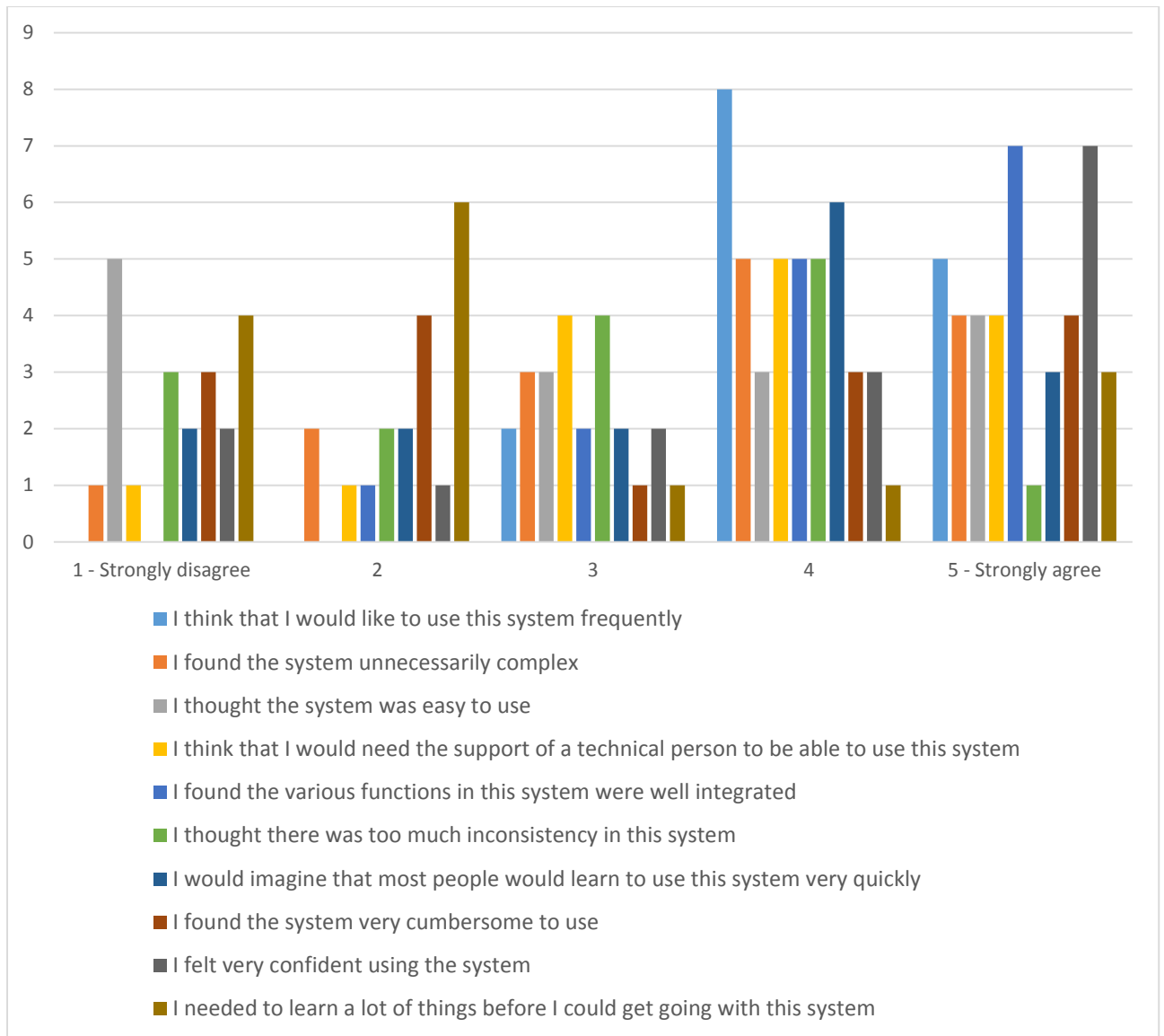
Figure 55 – Overall Usability Ratings – Social Work Practitioners

Feedback on the overall usability of the prototype Decision Support System was mixed. The majority of both user groups felt that they would use the system frequently, however, a greater number of social work practitioners provided more positive scores than the teenage group. Mixed feedback regarding the complexity of the system emerged from the evaluation process, with a significant number of respondents in both test groups reporting that they found the system unnecessarily complex. Indeed, whilst respondents understood the benefits

of the system some felt that the software was overly complex. In the case of social work practitioners, concerns were raised about the time burden of undertaking an assessment with this system. These findings correlated with responses to the question surrounding the ease of use; many respondents provided mixed views on the software. Interestingly, the majority teenage respondents felt that they could use software without the need for technical support. In contrast, responses from the social work practitioners indicated that some felt they would need extra technical support.

Both groups found the functionalities within the system were well integrated, however, a significant number of social work practitioners felt that too much inconsistency within the system. Moreover, both groups felt that users could learn the new system quickly and embrace the functionality.

The final three questions surrounding the usability of the system showed a mixture of views on the prototype. Indeed, the findings indicate that the teenager population found it easier to adapt to the new prototype but did not necessarily understand the benefits of every component. In contrast, the social work practitioner group provided favourable feedback in terms of the features but were somewhat more reserved about the functionality and usability of certain features.

7.10 Conclusion

The evaluation conducted made use of two separate user groups. User opinions served as a useful purpose to gain an overview of the acceptability of the prototype. The findings from the discussions and the questionnaire illustrate the different opinions of individual users of the software and those that have a duty of care for them. Overall the ratings provided by both groups did not illustrate a marked difference, with both groups being positive overall. Whilst the Likert scales utilised were useful to provide indications, more in-depth analysis could be provided by adopting a different approach. Further work is discussed later in the succeeding chapter when consideration would be given to longitudinal experiments with user groups measuring the prototype effects on the risks encountered over an extended time period.

The analysis of the elements of the prototype in further depth facilitated a view to be taken on the differences between the adults and the teenagers. The findings of the evaluation data suggest that the teenager demographic indicates acceptance of the prototype and that most would be happy to make use of the system as a means of reducing risk.

Considering the limitations of prototype, it is clear that difficulties exist in adapting a piece of software to suit the context of different individuals. The risk assessment system is not fine grained enough to serve the purpose and further development of the system is required. Furthermore, the rating system of each scale adds a complexity that requires further consideration.

As this research demonstrates, complex social constructs juxtaposed with complex immersive environments, require complex theoretical frameworks within which to examine them. That said, complexity need not be a barrier but serves to assist in gaining an understanding. Moreover, the results from the evaluation demonstrate that this is achievable.

Chapter 8: Conclusion

This chapter concludes this thesis by considering the achievements of the research and follows with consideration of the limitations. The chapter draws to a close with a discussion on future work.

The research set out to explore the emerging opportunities and risks in online gaming environments and sought to reduce the potential harm through development of a novel taxonomy of opportunities and risks together with a Decision Support System technological tool. To develop an effective taxonomy and DSS tool, an understanding of the online gaming arena as a whole was required. This meant an effective strategy.

1. The first was to conduct an effective review of the field of online environments and specifically online gaming environments exploring the issues as currently known.

2. The second was to understanding how to conduct effective research in a fashion that accounted for the viewpoint of individuals, and so a review was carried out of both quantitative and qualitative research methods.

3. The third was to apply the findings from the research into a holistic, human-centred piece of software which provided assessment tools to address identified risks.

It is common with qualitative findings to generalise the findings. Therefore, a conceptual framework emerged from the analysis that served as a useful tool for risk assessment. The prototype demonstrated that a supportive, acceptable tool for use by end users and professional practitioners could be created and accepted.

8.1 Achievements of Research

The findings of this research have challenged current approaches to technological risk reduction in online gaming environments. Therefore, the achievements of the research can be viewed in terms of progressing understanding related to the design of technologies to assist in the identification and reduction of risk to the individual.

The achievement of the objectives outlined in the introductory chapter of this thesis can be seen to have contributed effectively to the field of risk reduction. These objectives are discussed in turn as follows:

1. To gain a clear evidence-based understanding of opportunities and risks in online gaming environments;

By gaining a clear understanding of the opportunities and risks within MMORPG environments, this research has been able to contribute effectively to relevant safety planning for the groups concerned, namely professional practitioners and individuals. Publication outputs from this research has brought to the forefront emerging opportunities and risks in the online gaming arena. In addition, presentation at conferences and Safer Internet Day events has facilitated awareness raising of the aforementioned.

2. To develop a novel taxonomy framework to assist in the identification and assessment of opportunities and risks in online gaming environments;

Developing the taxonomy framework provided a novel, and relevant, tool for use in risk assessment, bringing a supportive framework for individual risk assessors requiring direction when considering risks. The taxonomy provides a common conceptual model by which practitioners can discuss more effectively the dangers faced in their fields. In addition, it provides a loose enough framework so that their risk assessment approaches are not too restricted.

3. To refine the proposed novel taxonomy framework using an ethnographical and survey evidence base;

4. For selected user groups to evaluate a prototype implementation of the taxonomy framework to gain an understanding of the acceptability of such a solution.

The prototype design, implementation and evaluation provided evidence that a novel combination of theoretical approaches could contribute effectively to the body of knowledge. This cross-disciplinary approach (social science, information systems, software engineering), has led to effective research design. Social factors influenced the technological design in such a way that resulted in a piece of software that was acceptable to both the individual and professional practitioner. The novel contribution that this research provides is that the complexity should not be a barrier to research, nor should it be avoided, but should be reflected in carefully selected and combined underpinning theories.

The evaluation of the prototype led to a positive outcome whereby teenagers and professional practitioners gave overall positive responses to the proof-of-concept Decision

Support System. Each step within the research provided an incremental approach to understanding and addressing the risks that online gaming environments bring to the individual. The understanding gained from using a mix of quantitative and qualitative techniques in the exploration of opportunities and risks provided a significant contribution to the research design. This provided a firm evidence base for the compilation of the assessment framework and these frameworks in turn formed part of the prototype development and implementation. This demonstrates that a combination of approaches was necessary to provide effective protection for the individual with the prototype as the end product. The prototype demonstrated that technology could be acceptable as a tool for risk reduction.

8.2 Limitations

Having discussed the objectives and achievements of this research, a number of limitations exist. The key limitations are summarised below:

- Insufficient time for further assessment. Time and financial constraints prevented further assessment of the prototype or a longitudinal ethnographical study of participants in online gaming environments. The prototype evaluations were not carried out in great depth and there were no opportunities to observe the prototype in a real life situation or over a period of time.

- Software constraints. The prototype Decision Support System was developed only for use in Microsoft Excel and as such is dependent on this platform. Upon reflection, the platform restricts the future development of the prototype and another platform would need to be considered for future development.

- The diagrams and models within this programme of research are based on the evidence from the literature reviewed juxtaposed with the findings indicated by the sample chosen through the adopted research methods.

Despite the limitations put forward above, the research programme has been able to demonstrate a valid contribution to knowledge and provided sufficient proof-of-concept for the ideas posited in the earlier sections of this thesis.

8.3 Future Work

Building upon this programme of research, the following is proposed as further work:

- Conduct a longitudinal study into the effectiveness of the prototype. Whilst initial feedback for the prototype has been very positive, it has not been tested with users engaging with software directly or for any period of time. Therefore, further work is required to measure the effectiveness of the prototype as a protective mechanism. The feedback gained here could be utilised to further strengthen the prototype to make it more robust. Respondents could then be invited to participate in a controlled experiment which they are assessed both both before and after engaging with the software to assess their level of risk.

- Develop the prototype for a variety of platforms. The prototype is currently limited for use in Microsoft Excel. This could be developed as a stand alone application useable across a variety of platforms including mobile devices.

- Develop the taxonomy for use in alternative online environments. The taxonomy could be developed further to be used in other environments. Research could be conducted to tailor the taxonomy to separate domains prior to testing for suitability. Feedback could be utilised to further develop and improve the taxonomy.

8.4 Review of Online Gaming Environments

Online gaming has changed dramatically during the years of undertaking this body of research. At the beginning there was little evidence of risk in MMORPG environments and online gaming was not high on the media agenda.

Since commencing this research this arena has changed and has proven to be a fast moving, evolving domain. The study of behaviours in online gaming and the psychology of gaming has become well established with recent entries of gaming addiction being incorporated into the Diagnostic Statistical Manual for Mental Disorders manual.

With the ever increasing uptake of online games, new opportunities and risks will continue to emerge. This research provides a contribution as to how such opportunities can be identified, classified and in the case of risks, mitigated. Therefore, this research has demonstrated that technology can be used to assist the protection of individuals in online gaming environments rather than exacerbate their problems.

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Appendices

Appendix A

PART I: Opportunities

Opportunities Access to Global Information

The amount of information available on the Internet has witnessed exceptional growth in the last decade and this is illustrated in the approximate number of websites online rising from 35,863,952 in February 2003 to 644,275,754 in March 2012 (Netcraft, 2012). End-user access to online content has also increased with 83.5% of the UK adult population having used the Internet in 2011 Q4 (ONS, 2012) and a study of 25,142 EU children revealed that 93% of 9-16 years go online at least weekly (Livingstone, 2011).

Online content has not only increased in volume but also in the quality and richness of information offered.   High speed Internet connections juxtaposed with new online multimedia technologies provide end-users with access to a wide array of information resources such as on-demand television, podcasts and interactive reports. Search engines (e.g. Google, Bing) facilitate ultra fast retrieval of information with algorithms capable of sorting pages based on their relevance to inputted keywords.

Since the advent of smart phones and widespread adoption of mobile technologies, access to online information is no longer constrained to the home or office environments. Indeed, 45% of UK Internet users used a mobile phone to go online in 2011, almost double that of 23% in 2009 (ONS, 2012). Mobile technologies provide greater flexibility, allowing individuals to consume information on the move.

Educational Resources

The Internet has become an integral part of education providing a plethora of digital resources to users of all ages. Vast amounts of information are available on a global scale on nearly unlimited topics, allowing scholarly research to be performed in a short amount of time.

There is increasing widespread support for the value of computers in primary, secondary and tertiary educational settings with governments providing a political commitment to their introduction (Plowman and Stephen, 2005). Indeed, in the UK, computers are seen by the government and others as having the potential to improve standards of students' education, in addition to supporting teachers in their everyday role (Chou and Tsai, 2002; Chuang and Tsai, 2005). Black (2011), states there is a critical need for children in elementary schools to have the opportunity to gain vital computer skills early in life whilst a survey study by the E-Learning Foundation (Vaughan, 2010) revealed that 51% of UK teachers believed that children with no Internet access are seriously disadvantaged in their education.

The ever increasing integration of the Internet into education and daily lives presents a corresponding need to ensure that young people know how to remain safe online. In response to this need, there are a growing number of online e-safety resources proffering age-appropriate advice to children, teachers and parents (e.g. kidssmart.org, thinkuknow.co.uk, saferinternet.org). In addition, there is also a growing emphasis on both

raising awareness of Internet safety literature and resources as well as the integration of teaching safe surfing techniques within the classroom environment. Indeed, there is a general consensus among the academic community that e-safety education as opposed to filtering and blocking is a more effective method of ensuring young people stay safe online (House of Lords, 2007; CEOP, 2012; AoC, 2006).

The adoption of online educational resources goes beyond the confines of the classroom with many secondary and tertiary educational establishments using online resources such as Virtual Learning Environments (VLE) to provide students with 24 hour access to resources such as lesson support material, assignments and homework (BBC News, 2010). Evidence illustrates that University establishments are promoting self-taught scholarly activities and research by providing free access to academic course materials such as lecture notes, presentation slides and podcasts. Examples include the MIT OpenCourseWare (2012) initiative and Apple's iTunesU; an infrastructure designed specifically for Universities, colleges and schools to enable the distribution of academic material including audio, video and e-book content (Apple in Education, 2012).

Survey research of 2,142 adults by the Pew Research Center revealed that there is increased value placed on e-learning with over half (51%) of college presidents in the United States thought that online courses provided the same value compared with courses taught in classroom (Parker et. al. 2011). Over three-quarters (77%) of the institutions surveyed currently offer online courses with almost one quarter (23%) of college graduates having previously taken a class online.

Online educational games and interactive websites are popular resources commonly used in the education domain. Otherwise referred to as "serious games", Gee (2003; 2008) observes that game players' regularly exhibit persistence, risk-taking, attention to detail and problem solving skills, all behaviours that ideally would be regularly demonstrated in school. Advocates of game-based learning argue that game environments enable players to construct understanding at individual paces according to their interests and abilities while fostering collaboration and just-in-time learning (Kopfer et.al. 2009).

Yien et. al's. (2011) study explored the influence of applying a game-based learning approach to nutrition education amongst 66 students across two classes of an elementary school. Results of the study not only revealed that game-based learning proved a more effective approach than that of traditional teaching, but that students also exhibited positive attitudes towards the use of game-based learning.

The vast array of educational resources available online gives Internet users the ability to gather information on almost any subject, in a variety of formats, unconstrained by time or physical location. Emerging resources such as podcasts and games accommodate different learning preferences and styles whilst enabling end-users to advance their learning at their own pace.

Civil or Political Participation

Research has shown that news consumption both online and offline is related positively to interpersonal discussion, political involvement and political engagement (Zuniga et al. 2009).

Smith (2013) asserts that online platforms, such as blogs, Wikipedia, YouTube, and Facebook provide an inclusive space for civic and political participation regardless of geographical location. Banaji and Buckingham (2013) discuss how the Internet and new media provides the means to revitalise civic life and democracy; commenting that governments, political parties, charities, NGOs, activists, religious and ethnic groups, and grassroot organisations have created a range of youth-orientated websites that encourage widely divergent forms of civic engagement and use varying degrees of interactivity.

Studies have shown (Leung, 2009) that that psychological empowerment (i.e. self-efficacy, perceived competence and desire for control) can be enhanced by one's content generation online and by one's attitude and behavior in civic engagement offline. Nardi et al. (2004), Trammell et al. (2015) and Leung (2009) found that motivations for civic or political participation included self-expression, social interaction, entertainment, passing the time, information and professional advancement. The study by Nardi et al. (2004) identified that bloggers document their lives, provide commentary and opinions, express deeply felt emotions, articulate ideas through writing and form and maintain community. Leung (2009) found that 'wanting to be recognised' was one of the strongest motivations for reading, writing and commenting on other people's blogs and posting videos on YouTube; while being entertained moderately affects forum participation and information contribution on Wikipedia. At the social level, Internet content producers value the diverse means to express and share their feelings, viewpoints and experiences. The interactive nature of the Internet attracts these content creators because the responses and comments that they receive on their content encourage them to do more. This, in turn, fuels the cycle of production and helps a cybercommunity with common interest to grow larger. Active Internet content

contributors tend to be young and less educated, but with high monthly income (Trammell et al. (2015). This may reflect the typical socioeconomic profile of Internet users: young, with the financial means to equip themselves with high-end personal computers and broadband access.

Community Involvement / Activism
On a societal level, social media create unprecedented opportunities for information flow (Sparrow, Liu and Wegner, 2011), affective expression (Golder and Macy, 2011), social influence (Bond et al. 2012) and apparently even democratic revolution (Alagui and Kuebler, 2011).

Lewis et al. (2014) examined the institutional emergence and evolution of one of the largest activist communities ever established online: Causes (www.causes.com). Causes is a free online platform for activism and philanthropy that is widely recommended by other activist and philanthropy that is widely recommended by other activist websites such as Movements.org. Causes's Facebook application allows Facebook users to join and donate money to specific social causes (e.g. earthquake surviviors in Haiti) or non-profit organisations (e.g. Aflac Cancer Center). Such platforms have a dominant role in social mobilisation and acts as a tool to create social movement.

McCaughey and Ayers (2003) highlights the role of the Internet in activism and the use of cyberspaces as protest sites. She defines online activism as a politically motivated movement relying on the Internet, commenting that activists now take advantage of the technologies and techniques to achieve their traditional goals. Activist strategies are either Internet-enhanced or Internet-based. In the former case, the Internet is only used to enhance the

traditional advocacy techniques, for example, as an additional communication channel, by raising awareness beyond the scope possible before the Internet, or by co-ordinating action more effectively. In the latter case, the Internet is used for activities that are only possible online, like a virtual sit-in.

Online activism is comprised of proactive actions to achieve a certain goal or of reactive actions against controls and the authorities imposing them. McCaughey (2003) argues that Internet activism fall into three general areas: awareness/advocacy; organisation/mobilisation; and action/reaction. This typology emphasises the direction of initiative; whether one sends out information or receives it, calls for action or is called upon, or initiates an action or reacts to one. These are progressive steps of online activism leading from basic information seeking and distribution to online direct action; a concept otherwise known as "hacktivism".

PART II: Risks

Advertising/Commercial Persuasion

The growth in access to the Internet has led to the development of millions of websites, many of which are heavily laden with commercial promotions. In the context of children, many child-orientated webpages also contain a plethora of targeted advertisements (Nairn and Dew, 2007), and interest groups, parents and lobbyists question the ethics of such practices. Estimates suggest that two-thirds of websites designed for children rely on advertising for their primary revenue with Neuborne (2001) stating that only 2% of children's websites carry no advertising.

Immersive advertising has become a characteristic way to market to young children, with some websites posting more than 50 different games for children to play (Kaiser Family Foundation, 2006). Unlike offline devices (e.g. televisions), the lines between entertainment and advertising online become blurred.

The effects of advertising on vulnerable individuals are in part addressed in understanding how children develop knowledge about advertising and persuasion (Moses and Baldwin, 2005). One of the more useful theoretical explanations to describe this process is the Persuasion Knowledge Model (PKM) (Friestad and Wright, 1995). The PKM posits that consumers, including vulnerable individuals, develop knowledge about marketers' motives and tactics throughout their lifespan. The persuasion knowledge shapes their attitudes and thoughts about influence agents, helping them identify how, when, and why persuasion knowledge shapes their attitudes and thoughts about influence agents, helping them identify how, when and persuasion attempts are made. As an individual's persuasion knowledge matures, he or she gains knowledge in recognising, evaluating, and responding to various advertising tactics (Wright et al. 2005). Indeed, according to An and Stern (2011) it is the acquisition of such persuasion knowledge that can enable an individual to apply scepticism to his or her interpretation of advertising messages.

While vulnerable individuals are able to differentiate between marketing and other forms of communication from a young age, they're more susceptible to manipulation through advertising messages and prone to accepting such messages as truthful and unbiased. Indeed, marketing tactics and advertising can lead children to adopt certain consumer behaviour which can, in turn, result in negative impacts on children's physical and mental

health. One such detrimental consequence is obesity which is increasing rapidly in both developed and developing countries; a condition linked to the consumption of energy-dense, micronutrient poor products that are high in fat, sugar, salt and which are marketed directly to young people.

In summary, marketing has evolved from commercials in traditional channels as vulnerable individuals have access to countless media outlets that are far more difficult to monitor than radio or television. Indeed, marketing to young people has expended significantly with the rapid embrace of online technologies. Research suggests that marketing messages may introduce vulnerable individuals to inappropriate content such as violence, sexualisation and unrealistic body images.

Biased / Misinformation

Information obtained through the Internet is abundant, easily available and often comprehensive and it can differ from information obtained via other media sources in several respects. Examples of misinformation are widespread and range from inflated advertising claims and political accusations to flawed scientific findings and assertions over health and medical issues.

Sunstein and Vermeule (2009) discussed the effects of biased assimilation and asserted that certain polarised groups are more susceptible to rumour or conspiracy-based information cascades. The authors attempted to understand the sources of false and harmful conspiracy theories and posit that people often attribute terrible events with some nefarious actor. Moreover, they assert that conspiracy cascades arise through the same processes that fuel

many kinds of social errors. Indeed, in some instances, false conspiracy theories can create serious risks (Sunstein and Vermeule, 2009) and in extreme cases, create or fuel violence.

Online support groups have certain benefits for users who may not be able to or do not have the desire to attend face-to-face support sessions, however, many groups are un-moderated and open to everyone, allowing less inhibited members, covered by a cloak of anonymity to 'flame' or harass other members with the intention to deceive or harass the group (Burrows et al. 2000).

Computer-based support groups have also been found to be addictive in nature where participants substitute life online for life in physical communities and thus possibly resulting in a decline in quality of life (Burrows et al. 2000).

Online extreme support group websites such as pro-anorexia, pro-suicide and pro-terrorism provide support and encouragement for extreme, often socially unacceptable behaviour. Bond et al (2012) investigated the risks from the increasing number of pro-anorexia websites online. The study examined 126 pro-eating disorder websites and online communities and found that the sites promote a disordered view of perfection in relation to body image, which normalises an ultrathin/emaciated body. Such advice is often dangerous and promotes harmful behaviour and reinforcement.

The risks arising from online extreme support group websites vary according to the type of content and the frequency of visits. Young people and individuals that lack self-esteem or self-confidence are especially vulnerable. Moreover, research suggests that an awareness of

these online communities among professional support workers (such as doctors and social workers) is vital, as it educational strategies that emphasise the importance of critical thinking around visual images in relation to the wider context of harmful content online (Bond, 2012).

Appendix B
   A. WoW Content and Mechanics

Players typically purchase a copy of WoW in a store, install the game software on a computer, and then connect to the game servers over the Internet. The game operates on a subscription based model with every player ('account') paying a monthly fee ($14.99 USD per month - £9.24) to access the game (Battle.net, 2015).

Situated in the virtual world of Azeroth and based on a Tolkienesque high fantasy motif, players create characters (otherwise referred to as an 'avatar' – 3D graphical representation of the user or user's alter ego) with distinctive looks and qualities such as intellect, strength, stamina and agility. Players are divided into realms which is a game world that exists for a few thousand gamers. Each realm is a complete version of the game world and players are tied to that particular realm. Gamers can interact with other players only within the same realm and cannot communicate with players located on different realms. Furthermore, players cannot normally move between realms. In World of Warcraft, the conflict between two major political factions, Alliance and Horde, provides the underlying storyline. Each faction provides a wide range of races and classes for players to customise their characters. Upon initial entry into the game, players are prompted to create and customise their avatar. The choice of abilities, professions, gender and aesthetic appearance vary according to the chosen faction, race and class of the character (Figure 1).

Once the characters are created and customised, players can begin their adventures in World of Warcraft. New players can take advantage of the interactive tutorial guide, which displays a large question mark in the middle of the screen and provides users with instructional text

to help players familiarise themselves with the new complex gaming environment. Gamers

are first introduced to simple, easy to accomplish quests, moving onto light combat, crafting

and grouping; all of which increase in difficulty and time commitment as the level increases.

During the familiarisation period gamers master the controls and physical movements of their

avatar. The structural characteristics of World of Warcraft are designed with realistic physics

principles meaning that players can sit, crouch, walk, jump and swim through the

environment, but suffer harm and in extreme cases death if they hold their breath under

water for an extended period or fall long distances (e.g. from a cliff). Players can switch

between first person and third person perspectives during game play.

Figure 44 Character creation and customisation in World of Warcraft

Players advance through 90 levels of play, acquiring equipment such as swords, armour and jewellery. They develop skills such as attacking and healing and slay an array of imaginative monsters dwelling in caves, dungeons, and encampments in varied landscapes. World of Warcraft is similar in aesthetic appearance to an animated cartoon in which the player controls the character using a combination of mouse and keyboard commands. Characters travel on foot, by air or sea through farms, fields, deserts, mountains, seas and other distinctive scenery. Sound effects and haunting music provides for an enhanced audio experience as players explore the vast and diverse terrain of Azeroth.

Analogous to many other MMORPGs, World of Warcraft operates on many different servers throughout the world, all of which host parallel versions of the persistent virtual environment. WoW offers the following four types of servers (realms), each of which incorporate different rules and styles of play:

- Player versus Environment (PvE) - (Normal – PvE rule set, role playing not enforced)

- Player versus Player (PvP) - (PvP rule set, role playing not enforced)

- Role Playing Player versus Player (RP-PvP) – (PvP rule set, role playing enforced)

- Role Playing Player versus Environment (RP-PVE) – (PvE rule set, role playing enforced)

Each of the above servers or realms offers the same general features such as questing, exploring and interacting with other players. In PvE servers, players compete against the gaming world and its computer controlled characters known as Non-Player Characters (NPCs). PvE servers are also known as 'Normal' servers in World of Warcraft and players can level their character and train skills without interruption or risk of random combat from another player. Distasteful practices and behaviours such as griefing tend to be less prevalent in PvE environments. In contrast, PvP realms denote open combat between players of any kind in

any location. PvP environments typically attract players who enjoy the thrill and risk of random combat with other players. Indeed, such players often also consider PvP adds a dimension of realism into their game play through fighting other 'real' players. Role Playing Player versus Player realms embrace both role playing and PvP rule sets. Likewise with Role Playing Player versus Player environments, which embrace both role playing and PvE rule sets. Role playing in World of Warcraft involves the player embracing the role character and acting it out in-game through emotes and other communication channels such as voice and text chat. Indeed, the character's personality, goals, morals and quirks may resemble that of the player or be completely different. When role playing, players generally recognise a boundary between what is 'in character' (i.e. acting as the character would in that particular situation) and what is 'out of character' (i.e. normal behaviour and communication analogous to real life).

The main activities in Azeroth comprise of combat and questing. Combat in WoW is typical of the MMORPG genre with players using weapons such as swords and bows, and casting various spells to inflict damage on their target. After successfully killing a monster, players are awarded experience points (otherwise known as 'EXP' or 'XP') which are required for level advancement, and in many cases, in-game currency or other valuable items (e.g. armour, weapons) dropped by the monster (otherwise known as "loot"). Questing is the activity of completing game designed tasks which typically include interacting with NPCs and collecting in game items. World of Warcraft has a particular focus on quests and completion of quests is rewarded with experience points, in game currency and/or valuable items. Gaining experience points is one of the key motivations for combating other players and NPCs and completing quests, particularly for gamers who want to level up their character. Obtaining

precious loot in order to equip an avatar with superior gear also becomes an increasingly important objective for more advanced players. As valuable items and coveted loot often is earned through battling challenging mobs or difficult quests, players often collaborate in groups or raids. When players are required to collaborate to accomplish complex and challenging battles, raids or quests, contention often occurs between collaborators regarding the distribution of loot.

Players progress in the game by earning experience points and reaching higher levels (maximum level in WoW = 85). This in turn improves players' existing skills, powers and abilities. New opportunities to acquire new skills, powers and abilities emerge as players make progress in the game. The character's level provides a reliable indication of the possibility of defeating an enemy target. Enemy targets also have a level assigned to them and players who have reached a level higher than that of their proposed target could be confident in a successful victory. In contrast, if the level of the enemy target is higher than that of the player then such a battle would almost certainly lead to death of the avatar. The level of reward (i.e. loot and experience points) rises exponentially with the level of difficulty and the vital statistics (e.g. experience level) of the target enemy are visible to the player in order that different strategies of combat can be adopted.

In World of Warcraft a character reaches the state of death when their health level reaches zero (or less). In the case of death, a player has 6 minutes to remain in their position or resurrect from the spirit immediately. When a character dies, a corpse is left in the location where death occurred. If the player decides to release their spirit from the corpse, they will turn into a spirit form (i.e. a ghost, or wisp) and the spirit form spawns at the nearest

graveyard. During the period in which a character is dead, the gaming environment graphics become monochrome, with scenery and other characters being displayed in black and white (see Figure 4).

Figure 45 - Dead character in World of Warcraft

The player's character will remain dead until they return to their corpse as a spirit, are resurrected by the spirit healer at a graveyard, or are resurrected by a player character near the corpse. When a player dies, all buffs (temporary beneficial spell) and debuffs (temporarily hinders targets actions and abilities) are instantaneously removed and all equipment items suffer a 10% durability reduction (except those in the characters inventory). Players have minutes in which to be resurrected by a player, or release their character at the nearest graveyard as a spirit. Whilst in spirit form, a player can run back to the corpse and rejoin it when in range with half-life and half mana. Ghosts are able to breathe underwater in lakes, rivers, coastal water and even lava, but the ghost can still die of fatigue in places such as deep oceans. Death in World of Warcraft causes moderate inconvenience rather than serious

failure, however, flow of combat is disrupted and players must spend time repairing damaged health, mana and equipment. In summary, death is often unavoidable, especially when players reach higher levels and engage in more complex raids and quests. Players typically experience numerous deaths during game play whilst searching for the best combat tactics and strategies to defeat their enemies.

The vast world of Azeroth is divided into different "zones" or "regions". These zones or regions correspond to different graphic sets which are required to load in order to display the game. When a players exits from one zone and enters another, there is temporary pause as the new graphic sets load, creating virtual boundaries and natural divisions in game play. Each zone varies in the level of difficult and corresponding level of threat. For example, the 'Durotar' region is classified as a level 1-10 zone which presents relatively low threats to new gamers. In contrast, the 'Jade Forest' region is classified as a level 90 zone where only players at level 90 are able to enter the zone without risking imminent death.

Game play in World of Warcraft is highly structured by levels with players generally following the same path of progressions. Quests, monsters and zones are all aligned by level and players must progress through the game and approach these in a relatively linear order. Ignoring this linear approach and interacting or battling with higher level objects or targets is strongly discouraged and frequently results in character death (e.g. a level 10 character attacking a level 50 enemy target or, a level 20 character travelling in a level 80 zone). In contrast, higher level players can safely interact or engage with lower level objects or targets (e.g. a level 20 character attacking a level 10 character) with a very high chance of success and little risk of character death. However, whilst the probability of a higher level character

winning a battle against a lower level character is particularly high, such encounters offer very small rewards, if any.

The structural characteristics of World of Warcraft offers limited flexibility for players to create their gaming experiences that deviate from the linear line of quests, monsters and zones. Indeed, in order to progress in the world of Azeroth, players are forced to interact and engage with objects (including fellow players, quests, zones and mobs) that are closely aligned with their characters own level. In comparison to other virtual environments (e.g. Second Life) that have no developer created goals or storyline and participants are free pursue their own goals and activities, World of Warcraft is a highly structured gaming arena in which players must adapt to new hierarchical structures, strict linear processes and forms of social interaction. Indeed, in comparison to other games in the MMORPG genre, the game mechanics in World of Warcraft are rigid with players experiencing relatively less flexibility than in other MMORPGs.

B. Character Creation and Customisation

In World of Warcraft, each player is required to choose their faction (Horde (evil), Alliance (good) or Neutral), race (analogous to species) and class (analogous to role or profession) of each character. At the time of writing WoW provided a total of 13 fantasy races for players to choose from, each categorised according to faction (e.g. Human race belongs to the Alliance faction and Orc belongs to the Horde faction). The choice of race is narrowed by the selection of faction; likewise the choice of class is restricted by the selected race. Each race has a pre-defined set of starting attributes and skills, such as intelligence and strength. Race has little influence a character's capabilities as the starting attributes have a very limited importance at the beginning and lose meaning as the character develops. Race does however

directly influence the characters appearance, for example, the Dwarf (Alliance) race is short and sturdy   whereas the Undead (Horde) race is tall, skeletal and sharp featured in appearance.

In contrast to race, a player's choice of class (role, professional) has far reaching implications on their entire gaming experience, with the class defining the primary adventuring style, abilities, strengths and weaknesses of the avatar. World of Warcraft provides 11 different classes for players to choose, however, the choice of class is in some instances restricted by the chosen race. The following table summarises the available class roles in accordance with race.

Races													
Alliance						**Neutral**	**Horde**					
Draeni	Ironforge Dwarf	Gnome	Human	Night Elf	Worgen	Panderen	Blood Elf	Goblin	Orc	Tauren	Troll	Forsaken

Class	Druid				✓	✓	✓					✓	✓	
	Hunter	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Mage	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
	Monk	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	
	Paladin	✓	✓						✓			✓		
	Priest	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
	Rogue	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
	Shaman		✓					✓		✓	✓	✓	✓	
	Warlock		✓	✓			✓		✓	✓	✓		✓	✓
	Warrior	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Death Knight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Regardless of race, characters of the same class type typically share most of the same abilities and take the same roles in combat. For example, warriors have excellent defence skills and high damage output. Priests, in contrast, are characterised as excellent healers but typically have a medium damage output. There are many nuanced differences between players of the same class but different races. Players can customise and develop their character as they progress in the game acquiring different weaponry and armoury; therefore players with the

exact same character class (e.g. both characters are Druids) and race at the same level could

represent a somewhat different set of skills through different acquisition of weapons and

abilities during game play. Despite the limited customisability of characters, the characters

class dictates most of the potential abilities and skills that the avatar might acquire in the

gaming arena.

The class of a character together with its level are two key attributes that a player would

typically use to identify and be identified with others in the MMORPG (e.g. Level 85 Warrior).

Therefore, the initial selection of race and class is a particularly important decision that

players face early in the game. Many MMORPG forums provide a plethora of comprehensive

research detailing the advantages and disadvantages of specific classes which support gamers

in making such a decision (e.g. Official World of Warcraft Player Forum:

http://eu.battle.net/wow/en/forum/ and PC Gamer offering discussions on classes, raids and

events http://www.pcgamer.com/forum/forumdisplay.php?f=8).

Classes represent different combinations of offensive and defensive skills, which result in

different roles being embraced in collective activities. Indeed, this sophisticated and complex

distribution of skill sets between classes encourages and in some instances forces WoW

gamers to collaborate, combining abilities to accomplish quests and fights that are too large

to be completed successfully alone.

C. Guilds

Groups and raids are commonly acknowledged as short term social groups, whereas guilds

represent a more stable, formal, solidified and hierarchical leadership structure in which in-

game actions are co-ordinated and shared goals accomplished (Chen et. al. 2008, Yee, 2006).

Guilds range significantly in size with a maximum capacity of 1000 members; a limit introduced with the most recent expansion pack Cataclysm. Players may only belong to one guild at any particular time but are permitted to leave one guild and join another. Similar to other MMORPGs, World of Warcraft offers various functionalities to support guild creation and management. Every member displays a tag highlighting their membership of a specific guild which is positioned directly underneath their character name. Figure 4 shows the characters who are members of the "Business Time" raid group.

Figure 46 "Business Time" Raid Group

Guilds have access to a private guild chat channel which is dedicated to facilitating communication between all guild members, in addition to the "Guild message of the day"; a message displayed when members login to the gaming arena. Other features include a specific guild window displaying a guild member register, individual and guild events, particulars of leadership to name but a few. In addition to the guild specific tools offered within the MMORPG environment, guilds often host dedicated websites (e.g.

knightsofmalta.info) often detailing specific information and history on the guild together with rules, play time, recruitment criteria, pictures and forum.

Guilds are persistent groups created by gamers for the benefit of themselves and other players. Similar to individual characters, guilds gain experience levels and loot when their members' complete guild based tasks and special quests. Access to amenities, special in-game items and other tools and benefits rise exponentially with the guild level. Although the materialistic and practical benefits are strong incentives which motivate players to initially join a guild, (guilds facilitate stable, strong and cohesive communities (Yee, 2007; Chen, 2008; Williams, 2006). Once established, guilds do not have such high overhead costs of co-ordination, management and recruitment that are commonly associated with groups.

Guilds make provision for close intimate socialisation in the larger gaming arena where members can discuss a myriad of topics (both game related and off-topic), mix with one another and develop meaningful relationships in addition to communal identities. Guild members generally follow a shared set of rules, norms, values and social rituals, which develop over time through repetitive interactions. Such norms and rules have been complied into guild charters; for example the Business Time guild forum proclaims to be "semi-serious" and sets out member expectations, loot rules, membership demographic and raid times (Businesstimeguild.com, 2012).

Guild reputation is an important facet to members and several third party websites offer dynamic ranking systems according to an aggregation of game statistics such as membership size, total wealth and kill versus death ratio (e.g. wowprogress.com; guildox.com;

wowtrack.org). These online facilities enable players to keep track of their collective achievements.

Guilds vary considerably with regard to their mission, size, structure and lifecycle (Chen et. al, 2007). Researchers (Taylor, 2006; William et. al, 2006) have attempted to classify guilds; however, arguably, the most distinguishing dimension is the extent to which a guild attaches importance to high level raiding. Raiding guilds are classified as the most hardcore guilds as they have a particular focus on the organisation of raids. Indeed, they aim to accomplish the most challenging, difficult and complex content in World of Warcraft. Raiding guilds generally set strict play requirements and operate raiding schedules. Large member bases are not necessarily attributable to raiding guilds as they are generally very selective in admitting new members. The selection criteria for admission is typically based on level, class, equipment and raiding availability.

In contrast, social guilds (otherwise known in the MMORPG community as casual guilds) gravitate towards engagement with other players and the development and maintenance of strong social ties that are created through game play. Indeed, combating and questing are deemed secondary priorities to establishing and maintaining intimate communities. Social guilds typically have no minimum play requirements and welcome players of any level or class. Admission requirements for a social guild are typically less stringent than other guild types with many encouraging real world contacts to join, such as family members and friends as well as alternative characters. For example, members of 'the One' social guild in World of Warcraft must adhere to the following rules: "1. Help yourself, 2. Help you guild members, 3. Help others". In addition the guilds philosophy can be accurately surmised in the following

statement "Helping guild members is usually self apparent. Give away potions, patches, bags, weapons, armour, enchantments. Send your wool to the nearest guild tailor. Give some unused magic items to the nearest group enchanter. If you need to, ask for a small donation to cover your base costs" (the One @ WoWKindness.com, 2005).

Keeping in mind the wide spectrum of guilds offered in World of Warcraft and other similar MMORPGs, it is important that players choose a guild that is best suited to their playing style and underlying game play motivation. For example, a casual gamer who is predominately motivated by the social aspect of the game would find a guild motivated by achievement and levelling and strict play schedule very challenging. Likewise, a player who is predominately motivated by achievement and enjoys pursuing the most challenging and complex game content would most likely become frustrated and disappointed by the relaxed organisation and casual game play that is commonly found in a social guild. Guild recruitment is often marketed through online websites detailing mission statements, philosophy and code of conduct. Applicants to an established guild are normally required to discuss their proposed membership with the guild officers, have the support of an existing guild member, or pass a probationary period, such as a series of grouping events with existing guild members, during which time the guild evaluates the prospective member's attitude, behaviour and playing abilities. These application procedures provide a mutually beneficial selection mechanism that ensures applicants are compatible with existing guild members and share the same values and principals. Guilds provide players with access to a social network of likeminded gamers, segmenting the enormous World of Warcraft environment into smaller, more intimate units.

Appendix C: Evaluation of Prototype DSS Questionnaire

Evaluation of a Prototype Decision Support System in the Assessment of Risk to Vulnerable Individuals in Massively Multiplayer Online Role Playing Games

Introduction

You are invited to participate in the evaluation of a prototype decision support system to support the professional assessment of risk to vulnerable individuals in Massively Multiplayer Online Role Playing Games.

The prototype decision support system is the culmination of a body of work undertaken as part of a PhD degree programme at Plymouth University. I am seeking feedback and evaluation from professional practitioners who are responsible for assessing the needs of and risks to vulnerable individuals (i.e. children, adolescents and vulnerable adults).

The body of research together with the aims, objectives and functions of the prototype are thoroughly documented in the Evaluation Report. The evaluation consists of a two stage process as follows:

1. To read the Evaluation Report and examine the prototype decision support system and;
2. To provide feedback on the prototype decision support system using the feedback forms on the following pages.

Once you have completed both part 1 and part 2 of the evaluation feedback forms, please save the Word document and return by email to the following address:
benjamin.sanders@plymouth.ac.uk
Please note that this evaluation process does **not** involve the collection or storing of any personal information.

Participation in this evaluation study is estimated to take no longer than 30 minutes.

Should you have any questions regarding this research, please contact me using the details provided in the footer.

Thank you very much for your time and assistance

Ben Sanders

Centre for Security, Communications & Network Research, Plymouth University

EVALUATION FEEDBACK FORM

Please enter your current job title:

Part 1 - Prototype Features

Please answer the following questions about the helpfulness of the prototype features using a scale of

1 – (Not Very Helpful) to 5 – (Very Helpful). Please also provide comments/feedback in the right hand column on each element.

	1 – Not Very Helpful 5 – Very Helpful	Comments
1. Add child	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	
2. Select child	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	
3. Control Risk Levels	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	
3.1 Using slider control to adjust thresholds	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	
3.2 View children at risk	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	
4. Game Motivation Scale	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	
4.1 Scoring Matrices (i.e. motivation taxonomy scoring matrix, pathological game addiction scale matrix)	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	
4.2 Incomplete/Complete Indicator	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	
5. Risk Indicator Report	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	
6. Risks Taxonomy	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	
7. Red risk indicator – Risks Taxonomy	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	
8. Transactional risk breakdown report	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	
9. Contextual influences visualisation	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	
10. Contextual influences breakdown report	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	

11. Red risk indication - Contextual influences breakdown report	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	
12. Automatic Risk Alerts	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	
13. Assessors Notes	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	

Part 2 - **Overall Rating of Decision Support System Prototype**

Please answer the following questions about the overall usability of the prototype using a scale of

1 – (Strongly disagree) to 5 – (Strongly agree). Please also provide any additional comments in the right hand column.

	1 – Strongly disagree 5 – Strongly agree	Comments
I think that I would like to use this system frequently	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	
I found the system unnecessarily complex	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	
I thought the system was easy to use	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	
I think that I would need the support of a technical person to be able to use this system	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	
I found the various functions in this system were well integrated	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	
I thought there was too much inconsistency in this system	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	
I would imagine that most people would learn to use this system very quickly	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	
I found the system very cumbersome to use	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	
I felt very confident using the system	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	
I needed to learn a lot of things before I could get going with this system	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	

Further Comments and Feedback

Appendix D: Prototype Decision Support System Questionnaire Scales

Yee's Motivation Taxonomy Questionnaire

Score the questions on the left using the scale on the right:	1-Not Important/Interesting/Often 2-Slightly Important/Interesting/Often 3-Moderately Important/Interesting/Often 4-Very Important/Interesting/Often 5-Extremely Important/Interesting/Often

	Inventory Item	Score
1	Levelling up your character as fast as possible.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
2	Acquiring rare items that most players will never have.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
3	Becoming powerful.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
4	Accumulating resources, items or money.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
5	How important is it to you to be well known in the game?	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
6	Being part of a serious, raid/loot-orientated guild	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
7	How interested are you in the precise numbers and percentages underlying the game mechanics?	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
8	How important is it to you that your character is optimised as possible for their profession/role?	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
9	How often do you use a character builder or a template to plan out your character's advancement at an early level?	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
10	Knowing as much about the game mechanics and rules as possible.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
11	Competing with other players.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
12	How often do you purposefully try to provoke or irritate other players?	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
13	Dominating/killing other players.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
14	Doing things to that annoy other players.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
15	Getting to know other players.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
16	Helping other players.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
17	Chatting with other players.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
18	Being part of a friendly, casual guild.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
19	How often do you find yourself having meaningful conversations with other players?	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
20	How often do you talk to your online friends about your personal issues?	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
21	How often have your online friends offered you support when you had a real life problem?	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
22	Would you rather be grouped or soloing?	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
23	How important is it to you that your character can solo well?	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
24	How much do you enjoy working with others in a group?	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
25	Having a self-sufficient character.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
26	How much do you enjoy exploring the world just for the sake of exploring it?	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

27	How much do you enjoy finding quests, non-player characters or locations that most people do not know about?	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
28	How much do you enjoy collecting distinctive objects or clothing that has no functional value in the game?	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
29	Exploring every map or zone in the world.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
30	Trying out new roles and personalities with your characters.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
31	Being immersed in a fantasy world.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
32	How often do you make up stories and histories for your characters?	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
33	How often do you role-play your character?	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
34	How much time do you spend customising your character during character creation?	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
35	How important is it to you that your character's armour/outfit matches in colour and style?	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
36	How important is it to you that your character looks different from other characters?	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
37	How often do you play so you can avoid thinking about some of your real-life problems?	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
38	How often do you play to relax from the day's school/work?	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
39	Escaping from the world.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

Motivation Taxonomy

Achievement	Score	Social	Score	Immersion	Score
Advancement Questions 1-5		Socialising Questions 15-18		Discovery Questions 26-29	
Mechanics Questions 7-10		Relationship Questions 19-21		Role-Playing Questions 30-33	
Competition Questions 11-14		Teamwork Questions 22-25		Customisation Questions 34-36	
				Escapism Questions 37-39	
Achievement Total	**/70**	Social Total	**/55**	Immersion Total	**/70**
Achievement Mean Average *(Achievement total/14)*		Social Mean Average *(Social total/14)*		Immersion Mean Average *(Immersion total/14)*	

Scoring
A. Sum together the scores for each motivation sub-category (i.e. advancement, mechanics, competition) and write the summed totals in the corresponding boxes
B. Sum together the scores for each motivation category and write the total in the motivation total boxes (i.e. achievement total, social total and immersion total)
C. Calculate the mean average for each motivation category and write the average score in the mean average boxes (i.e. achievement mean average, social mean average and immersion mean average)

Attitudes Towards Violence Questionnaire

Complete Parts 1 & 2
Part 1 - ATVC

Score the questions on the left using the scale on the right:	1-No 2-Maybe 3-Probably 4-Yes

	Inventory Item	Score
a	It's a good idea to hang out with people in gangs	1 ☐ 2 ☐ 3 ☐ 4 ☐
a	People with guns or knives are cool	1 ☐ 2 ☐ 3 ☐ 4 ☐
a	I think it's too dangerous for people my age to carry guns	1 ☐ 2 ☐ 3 ☐ 4 ☐
a	I try to stay away from places where I could get hurt	1 ☐ 2 ☐ 3 ☐ 4 ☐
a	People who use violence get respect	1 ☐ 2 ☐ 3 ☐ 4 ☐
a	I would join a gang	1 ☐ 2 ☐ 3 ☐ 4 ☐
a	Teenagers who are in gangs know what they are talking about	1 ☐ 2 ☐ 3 ☐ 4 ☐
a	I'm afraid of getting shot or stabbed *	1 ☐ 2 ☐ 3 ☐ 4 ☐
a	I'd feel safer with a gun or knife	1 ☐ 2 ☐ 3 ☐ 4 ☐
a	It's good to have a gun	1 ☐ 2 ☐ 3 ☐ 4 ☐
b	It's OK to carry gun/knife if you live in rough neighborhood	1 ☐ 2 ☐ 3 ☐ 4 ☐
b	If person hits you, you should hit back	1 ☐ 2 ☐ 3 ☐ 4 ☐
b	Parents should tell their kids to fight if they have to	1 ☐ 2 ☐ 3 ☐ 4 ☐
b	It's OK to beat up person for bad mouthing me or my family	1 ☐ 2 ☐ 3 ☐ 4 ☐
b	If person tries to start fight with you, you should walk away *	1 ☐ 2 ☐ 3 ☐ 4 ☐
b	It's OK to do whatever it takes to protect myself	1 ☐ 2 ☐ 3 ☐ 4 ☐

Reverse scored

Part 2 - CEAQ

Score the questions on the left using the scale on the right:	1-No 2-Maybe 3-Probably 4-Yes

Inventory Item	Score
Seeing a kid who is crying makes me feel like crying	1 ☐ 2 ☐ 3 ☐ 4 ☐
Other people's problems really bother me	1 ☐ 2 ☐ 3 ☐ 4 ☐
I would feel bad if the kid sitting next to me got in trouble	1 ☐ 2 ☐ 3 ☐ 4 ☐
It bothers me when my teacher doesn't feel well	1 ☐ 2 ☐ 3 ☐ 4 ☐
When I see a kid who is upset it really bothers me	1 ☐ 2 ☐ 3 ☐ 4 ☐
It would bother me if my friend got grounded	1 ☐ 2 ☐ 3 ☐ 4 ☐
I understand how other kids feel	1 ☐ 2 ☐ 3 ☐ 4 ☐
When I see someone who's happy, I feel happy too	1 ☐ 2 ☐ 3 ☐ 4 ☐
I would feel bad if my mom's friend got sick	1 ☐ 2 ☐ 3 ☐ 4 ☐
I feel sorry for kids who can't find anyone to hang out with	1 ☐ 2 ☐ 3 ☐ 4 ☐
I'm happy when the teacher says my friend did a good job	1 ☐ 2 ☐ 3 ☐ 4 ☐
I feel happy when my friend gets a good grade	1 ☐ 2 ☐ 3 ☐ 4 ☐
When I'm mean to someone, I usually feel bad about it later	1 ☐ 2 ☐ 3 ☐ 4 ☐
It's easy for me to tell when my mom or dad has a good day at work	1 ☐ 2 ☐ 3 ☐ 4 ☐
If two kids are fighting, someone should stop it	1 ☐ 2 ☐ 3 ☐ 4 ☐
I would get upset if I saw someone hurt an animal	1 ☐ 2 ☐ 3 ☐ 4 ☐

Attitudes Towards Violence (Child Version) Scores

Key	Factor	Score
a	Culture of Violence	/ 40
b	Reactive Violence	/ 24
Higher score indicates **stronger pro-violence attitudes** *Lower* score indicates **strong anti-violence attitudes**		
a. **Culture of Violence** *statements reflect a pervasive identification with violence as a valued activity* b. **Reactive Violence** *statements justify the use of violence as a response to actual or perceived threats*		

Children's Empathetic Attitudes Questionnaire (CEAQ) Score

Total CEAQ Score	/ 64
Higher score indicates **stronger empathetic attitudes** *Lower* score indicates **weaker empathetic attitudes**	

Griefing, Trolling and Cyberbullying Questionnaire

Complete Parts 1, 2 & 3
Part 1 – Griefing Questionnaire

[Question: Thinking about your online gaming experience, how often have you either witnessed, been a victim of, or been a perpetrator of the following types of griefing?]

Score the questions on the left using the scale on the right:	0-Never 1-Sometimes 2-Always

	Inventory Item	Witness (Content)	Victim (Contact)	Perpetrator (Conduct)
A	on ___ Verbal Harassment	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐
B	Spamming	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐
C	Kill Stealing	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐
D	Ninja Looting	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐
E	Player Killing/Ganking	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐
F	Corpse / Spawn Camping	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐
G	Mob Camping	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐
H	Mob Luring / Training	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐
I	Player Blocking	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐
J	Exploiting Loopholes	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐
K	Preying on New Players	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐
L	Scamming	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐
M	Team Disruption	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐
N	Event Disruption	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐
O	Role-Play Disruption	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐
P	False Accusations	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐

Explanation of Terminology (Mouse-over tips)

A. Verbal harassment - Intentional misuse of the chat interface or voice system in order to offend, harass, insult, threaten, or humiliate another player.

B. Spamming - Intentionally filling a chat channel repeatedly with messages of low relevance, utility, or messages that are against the game rules (such as in-game currency selling).

C. Kill stealing - When a player attempts to kill a mob that is already engaged in combat with another player, in order to reap their reward of experience, items or in-game currency.

D. Ninja looting - Taking loot that was earned by another player, by speed, guile, or a cheat. Typically, a player quickly loots mob corpses that they should not be looting.

E. Player killing / ganking - A player seeks out and kills players that are at a disadvantage. Most commonly they attack players with little health, and/or that are already engaged in combat.

F. Corpse / spawn camping - A player repeatedly kills the same individual multiple times, remaining in a location where the victim will respawn or resurrect (usually in a weakened state) and cannot escape the attack.

G. Mob camping - When a player remains in a location where a particular mob spawns in order to get items that only drop from this mob.

H. Mob luring / training - A player pulls or leads a hostile NPC or creature along behind them and attempts to get it to attack another player who does not desire that engagement.

I. Player blocking - A player obstructs another player's escape path to intentionally cause that character's death or confinement. A player may also obstruct another player's view or path from in-game resources (such as items, NPCs and mailboxes).

J. Exploiting loopholes - Unintended flaw in the game that a player exploits to their advantage. In the past loopholes such as duplicating items, activating items through solid walls and accessing restricted content have been exploited by some players.

K. Preying on new players - The killing of new and inexperienced players for fun, even though there is little direct benefit from attacker to the victim.

L. Scamming - Any method by which a player attempts to con another player out of something. This could include swindling items using fraudulent schemes or unfair trades.

M. Team disruption - When a player deliberately performs actions detrimental to their team, including friendly fire, wasting key game elements, luring unwanted mobs and colluding with the opposition.

N. Event disruption - When an event organized by players is purposefully interrupted by others.

O. Role-play disruption – Intentionally talking out of character to disrupt players that are role-playing their characters.

P. False Accusations – Falsely accusing another player of cheating and/or griefing

Part 2 – Trolling Questionnaire

[Question: Thinking about your online gaming experience, including the online gaming world, online gaming forums and chat, how often have you either witnessed, been a victim of, or been a perpetrator of the following types of trolling?]

Score the questions on the left using the scale on the right:	0-Never 1-Sometimes 2-Always

	Inventory Item	Witness (Content)	Victim (Contact)	Perpetrator (Conduct)
A	on Rude, insulting and provocative messages	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐
B	Inciting violence and disruption	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐
C	Promoting antipathetic emotions (i.e. disgust and outrage)	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐

Explanation of Terminology (Mouse-over tips)

D. Rude, insulting and provocative messages – Posting inflammatory messages in an online community with the sole intention of provoking negative reactions.

E. Inciting violence and disruption – Posting messages in an online community with the sole intention of inciting violent disruptive online behaviour.

F. Promoting antipathetic emotions – Posting messages in an online community with the sole intention of producing antipathetic emotions of disgust and outrage

Part 3 – Cyber Bullying Questionnaire

[Question: Thinking about your online gaming experience, how often have you either witnessed, been a victim of, or been a perpetrator of the following types of cyber bullying?]

Score the questions on the left using the scale on the right:	**0**-Never **1**-Sometimes **2**-Always

	Inventory Item	**Witness** (Content)			**Victim** (Contact)			**Perpetrator** (Conduct)		
A	Harassment	0 ☐	1 ☐	2 ☐	0 ☐	1 ☐	2 ☐	0 ☐	1 ☐	2 ☐
B	Cyber stalking	0 ☐	1 ☐	2 ☐	0 ☐	1 ☐	2 ☐	0 ☐	1 ☐	2 ☐
C	False malicious rumours	0 ☐	1 ☐	2 ☐	0 ☐	1 ☐	2 ☐	0 ☐	1 ☐	2 ☐
D	Embarrassment	0 ☐	1 ☐	2 ☐	0 ☐	1 ☐	2 ☐	0 ☐	1 ☐	2 ☐
E	Impersonation	0 ☐	1 ☐	2 ☐	0 ☐	1 ☐	2 ☐	0 ☐	1 ☐	2 ☐
F	Exclusion	0 ☐	1 ☐	2 ☐	0 ☐	1 ☐	2 ☐	0 ☐	1 ☐	2 ☐
G	Intimidation	0 ☐	1 ☐	2 ☐	0 ☐	1 ☐	2 ☐	0 ☐	1 ☐	2 ☐
H	Disclosure of personal sensitive information	0 ☐	1 ☐	2 ☐	0 ☐	1 ☐	2 ☐	0 ☐	1 ☐	2 ☐

Explanation of Terminology (Mouse-over tips)

A. Verbal harassment - Intentional misuse of the chat interface or voice system in order to offend, harass, insult, threaten, or humiliate another player.

B. Cyber stalking - Using the online gaming arena (or wider Internet) to stalk an individual or group of individuals. Characterised by: malice, premeditation, repetition, distress, obsession, vendetta, no legitimate purpose, personally directed, disregarded warnings to stop, harassment and threats.

C. False malicious rumours - An act specifically carried out to damage the reputation of a victim with the intention of persuading others to dislike that individual.

D. Embarrassment – Intentional causing of emotional discomfort, shame, loss of honour or dignity through the revelation of information that is commonly viewed as socially unacceptable.

E. Impersonation – Using a false identity (either by creation or stealing of account credentials) to act inappropriately generating unwanted negative reactions towards the victim.

F. Exclusion – Intentional, malicious exclusion from a group or guild

G. Intimidation – Threatening behaviour that would cause a personal of ordinary sensibilities fear of harm

H. Disclosure of personal sensitive information – Disclosure of personal and sensitive information with the sole intent of causing harm or embarrassment.

Griefing Questionnaire Scores

Witness (Content)	Victim (Contact)	Perpetrator (Conduct)
/ 32	/ 32	/ 32

Trolling Questionnaire Scores

Witness (Content)	Victim (Contact)	Perpetrator (Conduct)
/ 6	/ 6	/ 6

Cyber Bullying Questionnaire Scores

Witness (Content)	Victim (Contact)	Perpetrator (Conduct)
/ 8	/ 8	/ 8

Characterisations of Avatar Questionnaire

Complete Parts 1 & 2
Part 1 - Characterisations of Male and Female Avatars
a. Male Avatar

[Question: Thinking about your online gaming experience, how would you describe <u>male</u> avatars/game characters?] [<u>Do NOT prompt answers</u>]

Characterisation Categories	Score
Powerful (e.g. muscular, strong built)	
Aggressive (e.g. violent, deadly)	
Hostile Attitude (e.g. mean, cocky/arrogant, belligerent)	
Athletic (e.g. sport, fit)	

<u>Method and Scoring</u>
1. Write down all of the characterisations stated.
2. Classify each of the characterisations into the appropriate categories
3. Sum together the number of different characterisations in each category and write the score in the right column.

b. Female Avatar

[Question: Thinking about your online gaming experience, how would you describe female avatars/game characters?] [Do NOT prompt answers]

Characterisation Categories	Score
Provocative dress (e.g. skimpy clothes, naked, tight clothes)	
Curvaceous/thin figure (e.g. large bust, voluptuous, skinny)	
Sexual (e.g. slutty, sexy)	
Aggressive (e.g. violent)	

Method and Scoring
1. Write down all of the characterisations stated.
2. Classify each of the characterisations into the appropriate categories
3. Sum together the number of different characterisations in each category and write the score in the right column.

Part 2 – Exposure to In-Game Sexual Content

[Question: Thinking about your online gaming experience, how often have you either witnessed, been a victim of, or been a perpetrator of the following behaviours?]

Score the questions on the left using the scale on the right:	0-Never 1-Sometimes 2-Always

	Inventory Item	Witness (Content)	Victim (Contact)	Perpetrator (Conduct)
A	Role-play of sexual acts	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐
B	Sexual chat	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐
C	Use of add-ons to create naked character	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐

Explanation of Terminology (Mouse-over tips)
- Q. Role-play of sexual acts – acting out sexual behaviour in game
- R. Sexual chat – sending or receiving sexually explicit messages (over audio or text chat facility)
- S. Use of add-ons to create naked character – using game add-ons to modify the mechanics of the game to facilitate the transformation of a clothed avatar to nude/naked.

Exposure to In-Game Sexual Content Questionnaire Scores

Witness (Content)	Victim (Contact)	Perpetrator (Conduct)
/ 6	/ 6	/ 6

Game Addiction Scale (GAS)

[Question: Thinking about your online gaming experience, how often…]

Score the questions on the left using the scale on the right:	0-Never 1-Rarely 2-Sometimes 3-Often 4-Very often

	Inventory Item	
A	Did you think about playing a game all day long?	0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐
B	Did you play longer than intended?	0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐
C	Did you play games to forget about real life?	0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐
D	Were you unable to reduce your game time?	0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐
E	Have you felt bad when you were unable to play?	0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐
F	Did you have fights with others (e.g., family, friends) over your time spent on games?	0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐
G	Has your time on games caused sleep deprivation?	0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐
H	Did you spend much free time on games?	0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐
I	Did you spend increasing amounts of time on games?	0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐
J	Have you played games to release stress?	0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐
K	Have others unsuccessfully tried to reduce your game use?	0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐
L	Have you become angry when unable to play?	0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐
M	Have you neglected others (e.g., family, friends) because you were playing games?	0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐
N	Have you neglected other important activities (e.g., school, work, sports) to play games?*	0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐
O	Have you felt addicted to a game?	0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐
P	Were you unable to stop once you started playing?	0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐
Q	Have you played games to feel better?	0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐
R	Have you failed when trying to reduce game time?	0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐
S	Have you become stressed when unable to play?	0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐
T	Have you lied about time spent on games?	0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐
U	Did you feel bad after playing for a long time?	0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐

Game Addiction Scale (GAS) Scores

Salience		Tolerance		Mood Modification		Relapse		Withdrawal		Conflict		Problems	
A		B		C		D		E		F		G	
H		I		J		K		L		M		N	
O		P		Q		R		S		T		U	
/12 **Total**		**/12** **Total**		**/12** **Total**		**/12** **Total**		**/12** **Total**		**/12** **Total**		**/12** **Total**	

<u>Scoring</u>

A. Write the scale score from each of the inventory items (A-U) in the corresponding boxes in the score table (A-U)

G. Sum together the scores for each of the seven criteria (Salience, Tolerance, Mood Modification, Relapse, Withdrawal, Conflict, Problems)

Appendix E: European and Asian Survey Questions

PART A: European Survey

University of Plymouth

PARTICIPANT INFORMATION

This survey is designed for adult aged 18 years or older who play MMORPG's on a weekly basis at home. We seek your help to complete this online survey that is investigating the positive and negative effects of MMORPG gaming. You will be presented with **27** questions and it will require approximately 20 minutes of your time.

The purpose of this study is to understand from a social and psychological viewpoint the effects of online gaming

CONFIDENTIALITY

Your responses will be treated as confidential at all times and data will be presented in such a way that your identity cannot be connected with specific published data. Should you have any questions about the study or you wish to receive a copy of the results, please contact the researcher, **Benjamin Sanders** via email or the contact details given below. You have the right to withdraw from this survey at anytime without reason. By continuing you confirm your understand of the above.

Thank you very much for your time

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Section 1: Demographics

1 Please select your age category
   a) 18-21
   b) 22-29
   c) 30-39
   d) 40-49
   e) 50-59
   f) 60+

2 Please select your gender
   a) Male
   b) Female

3 Please select your country of origin

4 Please select the country to which you currently live in

5 Please select your current employment status
   a) Employed Full Time
   b) Employed Part Time
   c) Unemployed
   d) Student
   e) Retired

Section 2: Environment

1. How many computers do you have in your household?
   a) 1
   b) 2
   c) 3
   d) 4
   e) 5+

2. How many games consoles do you have in your household?
   a) None
   b) 1
   c) 2
   d) 3
   e) 4
   f) 5+

3. How many of these gaming devices are connected to the Internet?
   a) 1
   b) 2
   c) 3
   d) 4
   e) 5
   f) All of them

4. Do you prefer to play computer games or watch television?

   a) Play computer games
   b) Watch television
   c) No preference

   4. a. Why do you prefer to play computer games? (Tick all that apply)
   a) Games are more interactive than watching TV
   b) I like to control my character
   c) I enjoy talking to other players within the game
   d) There is always something different to do within the game
   e) I like thinking, responding, and being active within the game environment
   f) Other (please specify)

4. b. Why do you prefer to watch television? (Tick all that apply)

a) I like to relax and do nothing (i.e. watching TV does not require any active participation)
b) I find the television more interesting than playing games
c) I like to be close to other family members when I am at home relaxing
d) Other (please specify)

5. Do you prefer online community based games or offline games?
    a) Online community based games (e.g. World of Warcraft, StarCraft, Diablo)
    b) Offline games
    c) No preference

5.a. Please explain your preference

6. What is your general preferred method of communication with other people?
    a) Voice telephony (mobile and/or landline)
    b) Internet messaging (e.g. email, instant messaging facilities, online gaming chat facilities)
    c) SMS/MMS (Text/Picture) Messaging
    d) Face to Face

6.a. Why is this your preferred method of communication? (e.g. convenient, less pressurised, time to think about responses before replying)

6.b. Has this always been your preferred method of communication?
a) Yes
b) No

6.c. (If No [6.b]) Why did it change? (e.g. cheaper to use, quicker and more efficient, dislike telephone conversations)

7. What Internet-based functions do you use on a daily basis?
    a) Online gaming
    b) Instant messaging (e.g. MSN, Yahoo)
    c) Work related research (e.g. company research, school/college homework)
    d) E-mail
    e) Downloading of multimedia (e.g. music, games, pictures)
    f) Web browsing
    g) Online shopping
    h) Other (please specify)

8. Approximately how many hours in total do you think you spend on the internet each weekday? (including number of hours spent online at work/school plus number of hours spend online at home)
   a) 1 -4
   b) 5 - 9
   c) 10 - 12
   d) 12+

9. Approximately how many hours in total do you think you spend on the internet at the weekend?
   a) 1 -4
   b) 5 - 9
   c) 10 - 12
   d) 12+

Section 3: Online Gaming Experiences

1   Please type the names of all of the online games you play on a weekly basis into the box below:

2   Thinking about the games that you play on a weekly basis, rate on the scale of 1-5 how applicable you feel the statements below are to you (5 point Likert scale).

[S] When I am not playing the game I often find myself thinking about the next time I am going to play it

[T] I tend to want to spend increasing amounts of time playing the game

[T] I often find myself staying up until late in the evening playing the game

[S] I sometimes miss meals because I am too busy playing the game

[S] I am sometimes late for appointments/work/school because I am too busy playing the game

[M] I prefer to socialise with friends online than to social with friends offline

[S] The game is unimportant in my life

[S] I feel that I could live happily without playing the game ever again

[C] I sometimes find myself arguing with other members of the family because of me playing my game

[M] I feel a sense of excitement whilst playing the game

[M] I feel a sense of control and enjoy the feeling of success and power when playing the game

[S] I find the games I play an exciting discussion topic and often find myself involved in conversations offline

[SW] Whenever I use a computer for something other than gaming I find myself wanting to play the game

[S] I often find myself spending more money than I can afford on the game

[S] I find that my social life has at times suffered as a result of playing the game

[M] It is one of my main aims in life to be really good at playing the game

[S] I enjoy the challenge of learning how to play the game better

[W] I feel I would become irritated and annoyed if I could not play the game for more than a few days

[S] I feel that the game is the one of the most important aspects in my life

[C] I often find myself in arguments with other family members wanting to use the computer

[R] I have tried to cut down the amount of time I spend online but find that I still play it as much as before

[S] I find interacting with friends online much easier than interacting with friend's offline

I do not feel that I am 'addicted' to the game

I find that playing the game is more exciting than going out with friends

I do not see any reason to cut down the number of hours I spend playing the game

I do not think about the game when I am not playing it

3   On average, how many days a week do you play your game?
     a)   1
     b)   2

c) 3
d) 4
e) 5
f) 6
g) 7

4   On average, how many hours do you play your game during each weekday (Monday – Friday)?
    a) 1 – 2
    b) 3 – 4
    c) 5 – 6
    d) 7 – 8
    e) 9+

5   On average, how many hours do you play your game at the weekends (Saturday and Sunday)?
    a) 1 – 2
    b) 3 – 4
    c) 5 – 6
    d) 7 – 8
    e) 9+

6 Do you play any sport or are you actively involved in any other activities outside of the home/workplace or school environment?
   a) Yes
   b) No

   6.a. Approximately how many hours a week do you partake in these activities?
   a) 1 – 2
   b) 3 – 4
   c) 5 – 6
   d) 7 – 8
   e) 9+

   6.b. Do you feel that the time spent partaking in these activities has at all been affected by playing games?
   a) Yes
   b) No

   6.c. (If no [6]) Did you used to play any sport or were you actively involved in any other activities outside of the home/workplace or school environment?
   a) Yes
   b) No

   6.d. (If yes [6.c]) What was your reason for stopping?

Section 4: Online Interactivity
1. Who do you interact with online? (Please select the statement that is most appropriate to you)
   a) Only friends who I have met offline
   b) Mainly friends who I have met offline and some people who I have met online
   c) Mainly friends who I have met online and some people who I have met offline
   d) Only friends who I have met online

2. When playing your online game do you collaboratively interact and work with others to complete tasks/gain new powers/get to the next level?
   a) Yes
   b) No

   2.a When you talk to fellow players within the online game, do you talk only about in-game issues or do you talk about matters not relevant to playing the game?
   a) Only talk about in-game issues
   b) Both in-game issues and other issues

3. Do you feel that you have formed any close friendships with people online whilst playing your online game?
   a) Yes
   b) No

3.a. Are these friendships purely online based or do you know these people offline?
a) Only known online
b) Known both online and offline

3.b. Have any of your online based friends ever asked you to meet them offline?
a) Yes
b) No

3.c. Have you ever been asked to reveal any of the following types of sensitive information whilst playing an online game? (Tick all that apply):
a) Pictures
b) Passwords
c) Age
d) Location
e) Name
f) Family Details (e.g. mothers maiden name)
g) Relationship details
h) School Information
i) Telephone numbers (mobile and/or landline)
j) Email address
k) Place of work
l) Pets Name
m) Interests
n) Credit/Debit card details

3.d. Which of these details have you previously given away? (Please tick all that apply)
a) Pictures
b) Passwords
c) Age
d) Location
e) Name
f) Family Details (e.g. mothers maiden name)
g) Relationship details
h) School Information
i) Telephone numbers (mobile and/or landline)
j) Email address
k) Place of work
l) Pets Name
m) Interests
n) Credit/Debit card details
o) None

4. Have you ever become suspicious about any other players within an online gaming environment? (e.g. there messages to you, their attitude/respect towards other players)
a) Yes
b) No

4.a. (If yes [4])Would you be willing to briefly outline these cases in the box below:

Section 5: Your Experiences and Advice

1. Can you provide any other information that you believe is relevant to playing online games? (e.g. any other positive and negative experiences)

2. Do you have any advice or tips for people who play online games?

Section 6: Follow-Up Discussion

1. The principal investigator would like to discuss your online gaming experiences further with you. If you would be willing to do this, please select the 'I AGREE' option and enter your email address in the box below. The discussion will be strictly limited to your online gaming experiences and only your first name and email address is collected. These details will not be published or released to any other third party. If you do not agree please select 'I DISAGREE' followed by Next.
   a) I AGREE
   b) I DISAGREE

   1.a Please enter your email address in the box below:

PART B: Asian Survey

The Effects of Massively Multiplayer Online Role Playing Games

PARTICIPANT INFORMATION

This survey is designed for adult aged 18 years or older who play MMORPG's on a weekly basis at home. We seek your help to complete this online survey that is investigating the positive and negative effects of MMORPG gaming. You will be presented with **71** questions and it will require approximately 20 minutes of your time.

The purpose of this study is to understand from a social and psychological viewpoint the effects of online gaming

CONFIDENTIALITY

Your responses will be treated as confidential at all times and data will be presented in such a way that your identity cannot be connected with specific published data. Should you have any questions about the study or you wish to receive a copy of the results, please contact the researcher, **Benjamin Sanders** via email or the contact details given below. You have the right to withdraw from this survey at anytime without reason. By continuing you confirm your understand of the above.

Thank you very much for your time

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Section 1: Demographics
1. Please input your age: _____ years old.

2. Please select your gender:
    a. Male
    b. Female

3. Please select your country of origin:

4. Please select your current country of residence:

5. Which of the following bests describes what you are currently doing?
    a. Full time education (school/college/university)
    b. Government training/employment scheme
    c. In paid work full time (at least 30 hours)
    d. In paid work part time (less than 30 hours per week)
    e. Waiting to take up paid work already accepted
    f. Voluntary work
    g. Unemployed and receiving benefit
    h. Unemployed, not receiving benefit and actively looking for a job
    i. Permanently sick or disabled
    j. Looking after home or family

6. How many years have you used the internet in the home?
    a. Less than 1 year
    b. Between 1 and 2 years
    c. Between 3 and 4 years
    d. Between 5 and 6 years
    e. Longer than 6 years

Section 2: Environment

1. Where in the home are these computers typically situated? (tick all that apply)
    a. Lounge
    b. Bedroom
    c. Office/study room
    d. Spare room

2. What internet based functions do you use on a daily basis? (tick all that apply)
    a. Online games
    b. Instant messaging
    c. Web browsing
    d. Email
    e. Downloading of multimedia content
    f. Shopping
    g. Skype
    h. Online Banking
    i. Social Networking Services

Section 3: Massively Multi Player Online Role Playing Gaming Experiences

Please answer the questions below based on your experience with the current MMORPG game you spend the most time playing.

1. What is the MMORPG you spent the most time playing now?

2. How many different avatar names do you use in the MMORPG you spend the most time playing?
    a. 1
    b. 2
    c. 3
    d. 4
    e. 5+

3. How many times have you sold your avatar for real money? (If none, please input 0 into the box)

    4. B. Have you ever regretted selling your character for real money?
5. On average how many days a week do you play your current most played MMORPG?
    a. 1
    b. 2
    c. 3
    d. 4
    e. 5
    f. 6
    g. 7
6. Approximately, how many hours do you play your game during on a weekday (Monday – Friday)?
7. Approximately, how many hours do you play at your game on a weekends, Saturday and Sunday combined?
8. Hypothetically, if you could choose, would you prefer to live:
    a. In a virtual online gaming world
    b. In the real world environment in which we exist today

4. Thinking about the above MMORPG that you are currently playing, how applicable do you feel the statements are to you?

(1   2   3   4   5   6   7)
Never   Occasionally   Often

[S] When I am not playing the game I often find myself thinking about the next time I am going to play it

[T] I tend to want to spend increasing amounts of time playing the game

[T] I often find myself staying up until late in the evening playing the game

[S] I sometimes miss meals because I am too busy playing the game

[S] I am sometimes late for appointments/work/school because I am too busy playing the game

[M] I prefer to socialise with friends online than to social with friends offline

[S] The game is unimportant in my life

[S] I feel that I could live happily without playing the game ever again

[C] I sometimes find myself arguing with other members of the family because of me playing my game

[M] I feel a sense of excitement whilst playing the game

[M] I feel a sense of control and enjoy the feeling of success and power when playing the game

[S] I find the games I play an exciting discussion topic and often find myself involved in conversations offline

[SW] Whenever I use a computer for something other than gaming I find myself wanting to play the game

[S] I often find myself spending more money than I can afford on the game

[S] I find that my social life has at times suffered as a result of playing the game

[M] It is one of my main aims in life to be really good at playing the game

[S] I enjoy the challenge of learning how to play the game better

[W] I feel I would become irritated and annoyed if I could not play the game for more than a few days

[S] I feel that the game is the one of the most important aspects in my life

[C] I often find myself in arguments with other family members wanting to use the computer

[R] I have tried to cut down the amount of time I spend online but find that I still play it as much as before

[S] I find interacting with friends online much easier than interacting with friend's offline

I do not feel that I am 'addicted' to the game

I find that playing the game is more exciting than going out with friends

I do not see any reason to cut down the number of hours I spend playing the game

I do not think about the game when I am not playing it

Section 4: In Game Behaviour

Thinking about your behaviour when playing MMORPG's, how often do you feel you exhibit the following types of behaviours?

(1   2   3   4   5   6   7)

[SP] Talk proudly about your experience and expertise in MMORPG's
[SP] Make fellow players aware of your talents as a MMORPG player
[SP]Make players aware of your achievements and accomplishments within the game
[IN] Compliment your fellow gamers so that they will see you as likeable
[IN] Praise members of your guild or group for their accomplishments so they will consider you a nice person
[IN] Do personal favours for your fellow gamers to show them that you are friendly
[IT] Let other gamers know that you can make things difficult for them if they push you too far or do not co-operate with you
[IT] Deal forcefully with fellow gamers when they hold you back in trying to accomplish a specific task or goal within the game
[IT] Deal strongly or aggressively with gamers who interfere with your group or guild
[S] Act like you know less than you do about the game so people will help you out
[S] Pretend not to understand an aspect of the game to gain someone's help
[S] Act like you need assistance in the game so other players will help you out

Section 5: Self Reflection
Thinking about your feelings when playing MMORPG's, how true are the following statements to you?

(1	2	3	4	5	6	7)
Not at all true			Somewhat true			Very true

1. I do what I am doing during gaming because I want to.

2. After gaming for a while I feel pretty confident.

3. I feel I am well respected as a gamer.

4. I am pretty skilled at gaming.

5. I feel I have some choice during gaming.

6. I feel really distant to my co-gamers

7. I think I am doing pretty well in gaming compared to other people

8. I feel close to my co-gamers.

9. I feel like I have to do what I am told during gaming

Section 6: Online Interactivity

1. When you talk to fellow players within the online game, how often do you talk to them about the following?

    (1   2   3   4   5   6   7)

    Never   Occasionally   Very Often

    a. Game play related issues
    b. Give advice on personal issues
    c. Receive advice on personal issues

2. Who do you interact with in the game? (please select the statement that is most appropriate to you)
    a. Only friends who I know offline
    b. Mainly friends who I have met offline and some people who I have met in the game
    c. Mainly friends who I have met in the game and some people who I have met offline
    d. Only friends who I have met in the game

3. How often do you follow the advice on personal issues you receive from fellow gamers?

    a. Always
    b. Frequently
    c. Sometimes
    d. Occasionally
    e. Never

4. Which of the following technologies do you use when communicating with fellow MMORPG players? (tick all that apply)
    a. Instant messengers
    b. IRC chat
    c. Voice chat (e.g. ventrillo)
    d. SMS
    e. Home Phone
    f. Mobile / Cell Phone
    g. Facebook
    h. Other social networking websites

5. Thinking about your online and offline friendships, which statement is most applicable to you?
    a. I feel I have developed closer friendships with online gaming friends than offline friends
    b. I feel I have developed closer friendships with offline friends than online gaming friends
    c. My friendships with both online gaming friends and offline friends mean the same to me

6. When you meet with a fellow gamer you know from playing the game in person, was the fellow gamer who you expect him/her to be?

    a. Exactly what I expected it to be
    b. Somewhat what I expected it to be

    c.   No prior expectations

    d. Somewhat different to how I expected it to be

    e. Completely different to how I expected it to be

    f.   I have never met a fellow gamer in person

7. Which of these details have you previously given out within an online gaming environment? (tick all that apply)

    a. Age

    b. Online gaming account details

    c. Pictures

    d. Passwords

    e. Real name

    f. Family details

    g. Relationship details

    h. Home address

    i.   Mobile telephone number

    j.   Home telephone number

    k. Email addresses

    l.   Place of work

    m. Pet names

    n. Interests

    o. Financial data

8. Have the actions or messages of fellow online gamers ever made you feel worried or concerned?

    a. Yes

    b. No

    7.A. Can you briefly outline these cases in the box below:

Section 7: Follow-up discussion

It would help my research very much if I could discuss your online gaming experiences with you either over the phone or in person. It would take only 20 minutes. Would you be able to help?

    a. Yes

    b. No

If yes, Please enter your first name and email address in the box below:

PART C: Semi Stuctured Telephone Interview Questions

Semi Structured Interview Questions

1. Would you describe your gaming as addictive?
2. Could you give up gaming?
3. Have you tried to reduce your time playing? Has this been successful?
4. Do you find yourself spending more and more time gaming?
5. Do you play by yourself or with family members?
6. Have you ever felt concerned about your privacy whilst playing online games?
7. Have you ever met online based friends in person? How would you describe this experience?

Appendix F: Research Papers

An Assessment of People's Vulnerabilities in Relation to Personal and Sensitive Data

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Abstract

Social engineering refers to a number of techniques that are used to exploit human vulnerabilities and manipulate people into breaking normal security procedures. Evidence suggests that this problem is rapidly increasing and cyber criminals are using a magnitude of different avenues to reach their intended victims. This paper presents an assessment of people's vulnerabilities in relation to personal and sensitive data. The experiment used an online web survey which comprised of both direct and non-direct social engineering attack scenarios. In addition the survey measured and assessed the level of risk that social networking users are currently exposing themselves to. The results showed that respondent's security awareness levels had improved on previous studies but significant problems still existed with user's abilities to detect and appropriately respond to social engineering threats.

Keywords

Social Engineering, Human Vulnerabilities, Phishing, Social Networking

1. Introduction

The protection of personal and sensitive data has previously been allied with technical based security measures. However, it is becoming increasingly apparent that technical solutions alone will not solve the problem and that people are typically the weakest link in the security chain (Rabinovitch, 2007). As people are now classified as the weakest link, it is important to ensure a high level of education, awareness and behaviour amongst individuals in order to maximise the protection and security of personal and sensitive data (Mitnick, 2002). Differing personalities inherently bring with them various potential vulnerabilities. These vulnerabilities are often exploited using one or more social engineering exploits.

Limited protection can be implemented to protect a user from feeling vulnerable to divulging information. Unlike physical network infrastructures, no patches or security policies can be applied to improve and protect against human misjudgements.

An online survey was conducted by the Centre for Information Security & Network Research which aimed to assess the extent of human vulnerability in relation to the protection of personal and sensitive data.

2. Background

The social engineering phenomenon is nothing new. Fraud has been in existence for decades with large scale phishing attacks dating back to 2003 (Furnell, 2008). Cyber criminal activity has become more prevalent over the last five years and numerous investigations have been conducted exploring the avenues in which human vulnerabilities are exploited using different social engineering based attacks (Tipton and Krause, 2003).

Social engineering comes in many different forms but can be divided into two main categories; direct and non-direct. Direct attacks typically involve direct communication with a specific victim. Such attacks are typically executed by face to face contact or over the telephone. Non-direct attacks in contrast are not usually aimed at one specific individual or organisation but sent to a wider audience. The most common form of which is phishing emails. Mitnick and Simon (2002) states that direct social engineering attacks heavily rely on collating information about the intended victim. The plethora of readily available information which can be obtained from a magnitude of sources gives a social engineer a distinct advantage.

Prior studies have investigated and measured the viability and successfulness of both direct and non-direct attacks. In 2004, InfoSecurity surveyed 172 office workers at Liverpool Street Station. This direct based study revealed that 71% of employees were willing to divulge their login details for a free Easter egg (Leyden, 2004).

A further direct based study was conducted in 2005 to investigate the willingness of the general public to divulge personal and sensitive data. The survey disturbingly showed that 92% of the 200 demographics questioned divulged sensitive information such as their mother's maiden name, first school and date of birth in return for a chance to win free theatre tickets. In addition, many of the surveyed demographics voluntarily disclosed their names and address. The researchers reported that they had acquired enough information to access online accounts and open bank accounts in victim's names (BBC News, 2005).

A more recent non-direct study conducted by Karakasiliotis *et al.* (2007) made use of an online survey to present a mixture of legitimate and illegitimate phishing emails and respondent demographics were required to analyse and differentiate between these emails. The study revealed that out of the 179 participants, only 50% of demographics were able to correctly identify genuine emails and only 60% were able to correctly identify phishing emails.

The prior studies documented above illustrate the vulnerabilities that exist amongst the end user community and the corresponding threat that is posed upon the protection of personal and sensitive data. However many of the threats described

above have been defined and explored since the turn of the millennium and as such it would not be unreasonable to expect organisations to embrace a suitable security policy incorporating methodologies to counter and safeguard against potential social engineering attacks.

3. Understanding and Perception

Evidence suggests that the underlying reason for exploitation is due to a distinct lack of awareness and understanding. End users are blatantly unaware of the potential consequences of their actions and do not understand the value of the data to which they are responsible for.

The age old saying of 'little knowledge is very dangerous' stands true with regards to end users perception of security. The problem is further exacerbated by users misunderstanding of network and end point security based applications. Furnell (2008) states that many users completely misunderstand the level of cover that such security applications provide. Discussions with such users revealed a false sense of security in that users perceive themselves as being 'completely protected' from all types of threat including social engineering attacks because they have an 'Internet Security Suite' installed. Many users do not understand the potential level of danger and hostility they are exposed to when accessing online facilities and the aforementioned false sense of security not only increases user's complacency but also greatly increases their chances of exploitation. Indeed, a recent study conducted by Furnell *et al.* (2008) interviewed 20 novice users in detail to assess their views and experience with Internet Security. The study revealed that demographics held a general awareness of the existence of threats but less familiarity with the appropriate safeguards beyond a very basic level. In addition, the study found that users accepted that they were ultimately responsible for their own protection but appeared somewhat unconcerned about the potential impact of the threats faced (Furnell *et al.* 2008).

The sophistication of modern day security products inherently bring with them greater complexity. The extent to which such security programs can be understood is often undermined by a number of human computer interaction design issues. Complex jargon and technical terminology can potentially impede the usability of security features in practice and consequently further increase the vulnerability of end users (Furnell *et al.* 2006).

4. The Risks of Social Networking Websites

As discussed in Section 3, evidence suggests that the rapid adoption of online facilities such as social networking websites have not been matched with a corresponding embrace of security culture (Furnell, 2008). Indeed, prior research has found that end users are recklessly posting personal and sensitive data onto social networking websites oblivious of the potential consequences. Many of the 50 million 'Facebook' subscribers were reported to be under the misperception that they had an antivirus package installed and deemed themselves to be 'protected'. King

(2008) states that due to the quasi-intimate nature of social networking websites, people share all types of personal and sensitive information, leaving them open to attack. In addition, according to a senior researcher at ScanSafe Ltd, cyber criminals are using personal details from social networking websites to help make phishing emails appear more convincing (ScanSafe, 2008).

A study conducted by the Information Commissioner's Office (ICO) in 2007 revealed that 4.5million web users aged between 14 and 21 could be vulnerable to identity theft as a result of giving up personal and sensitive data on the internet. The study of 2,000 British citizens showed that two-thirds accept people who they did not recognise as 'friends' and that half purposely deliberately allow public viewing to attract new online friends. 10% of demographics stated that they were not concerned that their profile could be viewed by strangers and 7% did not consider that privacy settings were important. The study also revealed that people were posting sensitive details such as their date of birth, mother's maiden names, pet names, telephone numbers, email addresses and their home address (ICO, 2007). In addition, an article published by the Daily Telegraph in November 2007, stated that children post more personal and sensitive on social networking websites than adults (Daily Telegraph, 2007).

The evidence documented in this section begins to enlighten the reader as to the scale and significance of the threat posed by user's recklessness to post personal and sensitive data online.

5. An Assessment of People's Vulnerabilities

The prior studies presented thus far clearly illustrate a lack of awareness and understanding amongst individuals and organisations. The findings presented in the succeeding sections provide an up-to-date assessment of people's vulnerabilities in relation to personal and sensitive data.

In order to assess people's vulnerabilities in relation to personal and sensitive data the authors made use of an online survey to target demographics of varying ages, cultures and levels of education in the shortest timeframe.

5.1. Assessment Design

The survey consisted of the following five sections:

Section 1: Demographics: This section focused on the specific individual attributes of the respondent demographic. Information such as age, gender, country of origin and level of education were collated. In addition, demographics were asked if they were students at the University of Plymouth and if they had previously undertaken any security related modules. The purpose of this section was to understand if any of the aforementioned attributes affected demographics responses.

Section 2: Computer Security: In response to the concerns raised in section 3, this section asked respondents five questions regarding their system security. The aim of this section was to gain a clear insight into individual's awareness for the need of basic system security. Respondents were asked where they used a computer and if they installed the latest updates to their computer when released. They were also asked how long they spend on the internet daily and whether or not they had a firewall installed. In addition demographics were asked if they had antivirus and anti spyware package installed and how often it was updated.

	Questions:	Answers:	Rationale:
1	You are about to visit a website which is of interest to you when your firewall alerts you that your PC is attempting to make a connection to the Internet. What action would you take?	(Open Question)	Measures users risk taking ability and their understanding of a firewall.
2	You receive an email from your bank, stating that they are performing updates to their system. You are asked to sign in with your online banking credentials and verify your details are correct. What do you do?	1. Click the link from the email and sign in 2. Phone your bank and ask for more details 3. Visit the site later	Measures users' ability to detect and respond to phishing based attacks.
3	You have been using another individual's computer and visited a website that appeared to be malicious. You suspect that as a result the machine has become infected with a virus. What action would you take?	1. Immediately inform the individual about your suspicions 2. Leave them to find out later 3. Try and fix the problem yourself	Measures user's honesty and the importance of trust within computer security.
4	You are at work and a colleague has left their computer terminal logged on. Microsoft Outlook is running in the task bar. What action would you take?	1. Lock their computer 2. Inform user that the computer is logged on 3.Look through their emails/documents 4. Shutdown/turn off their computer 5. Notify an onsite technician	Measures users' integrity and honesty with regards to personal and sensitive data.
5	You arrive at work one morning and realise that you have left your access card at home. You require access to a restricted area and need your card. Someone approaches the door and opens it. What would you do?	1. Follow them in and continue your day 2. Go to the card issuing office and request a new temporary access card 3. Go back home and collect your access card	Measures users' understanding and awareness of the importance and need for physical security.
6	A friend owes you money and you are having difficulty in retrieving it. One day you notice that their computer is logged into their online banking. Would you take this opportunity to transfer the funds owed to you?	1. Yes 2. No	Measure users' trust and integrity when put in an advantageous situation.

Table 1: Hypothetical Scenario Based Questions

Section 3: Security Awareness: Section 3 placed the respondent demographics in 6 different hypothetical scenarios relating to security awareness. This section aimed to understand the extent of an individual's risk taking ability as well as measuring their awareness of potential social engineering vulnerabilities. Table 1 details the questions posed in this section along with the choices of pre-defined answers.

Section 4: Social Engineering: Leading on from the research previously conducted by Karakasiliotis *et al.* (2007), this section presented respondent demographics with 5 emails from well known online companies; namely eBay, Halifax Bank, PayPal and Amazon. Respondents were asked to identify the whether they deemed the email to be legitimate or illegitimate. Evidence suggests that the majority of online users are most susceptible to phishing based attacks. It was therefore considered prudent to gain an up-to-date insight of end user's abilities to differentiate between genuine and phishing emails.

Section 5: Social Networking: As seen by the evidence outlined in section 4, the potential dangers of social networking sites are growing considerably. The final section of this study asked respondent demographics to select all of the types of personal and sensitive data they would be willing to post online. The aim of this section was to gain an up-to-date insight into the extent of which such users are making themselves vulnerable.

5.2. Results

5.2.1. Demographics

The survey assessed the abilities of 86 demographics with regards to detecting and responding to direct and non-direct social engineering attacks. Invitations were circulated using email distribution lists and the majority of respondents were computing and engineering students in either UK or French universities. It is therefore highly likely that these participants received significant previous exposure to security related education and awareness programs. In addition, this exposure could have influenced respondent's answers due to increased levels of awareness.

It is commonly acknowledged that the majority of students enrolled on technical degrees in the UK are male. In 2008 a total of 297 students were accepted onto computer science, engineering and technology degrees at the University of Plymouth. 88% were male with only 12% were female (UCAS, 2008). These statistics are reflected in the research detailed below.

83% of respondents were male and 17% female. 14% of respondents were aged between 18-20, 58% aged between 21 – 25, 20% aged between 26 – 40, 3% aged between 41 – 49 and 5% were 50 years old or more. 84% of respondents originated from developed countries leaving 16% from undeveloped countries. 30% of respondents were students of the University of Plymouth out of which 74% had previously undertaken one or more security modules. The remaining 70% of

participants comprised of (26%) students from ESIEA Engineering Institute, France and (74%) were non-students from the UK.

The study found that none of the aforementioned variables significantly influenced demographic responses. Indeed, the results suggest that individuals of all ages, levels of education and countries of origin lacked awareness regarding social engineering exploits.

5.2.2. Computer Security

52% of respondents spent more than 4 hours online a day and 30% spent between 2 and 4 hours online daily. 85% used a computer both in work and at home. These results show a high level of online activity amongst respondent demographics. As discussed earlier in this document, it is crucial that end user awareness is sufficient enough to safeguard against the ever increasing threats and exploitations.

Figure 1 shows that the majority of surveyed demographics realised the importance of applying critical updates and the necessity of utilising a firewall. The results were more sporadic regarding the installation and updating of antivirus and antispyware packages. This indicates that users are unaware of the importance of antivirus and antispyware programs.
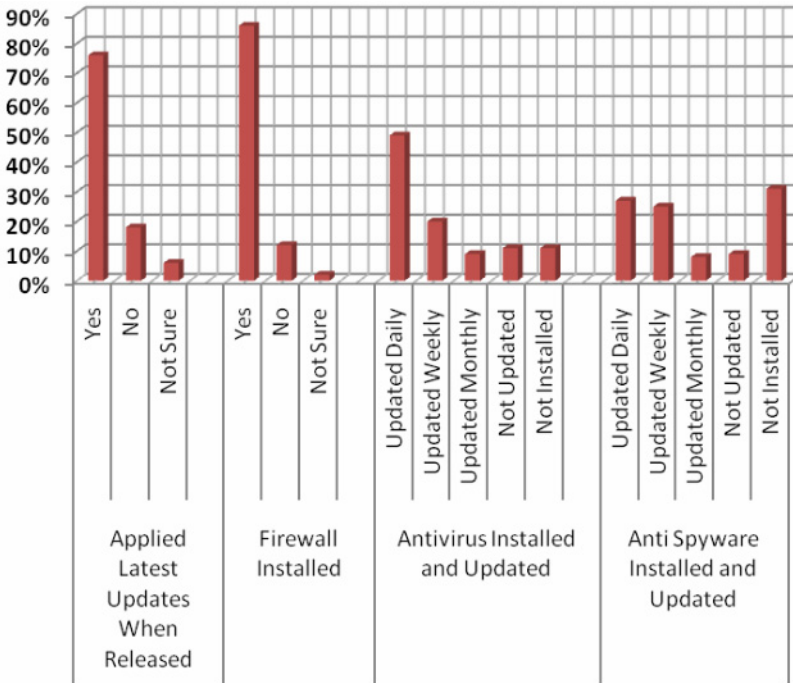
Figure 1: Computer Security Results

5.2.3. Security Awareness

Understanding the need for installing and updating protective security software is crucial. End users without adequate up-to-date security software are vulnerable to exploitation. Personal computers are often hacked to gain personal and sensitive information such as a person's identity and bank details.

The first question (Table 1) in this section asked respondents what action they would take if their firewall alerted them that their PC is attempting to make a connection to the internet. The question asked respondents to type an answer into a text box. As the demographics answers varied considerably due to the question being 'open', an analysis of these responses is summarised below.

Out of the total 86 respondents 15% did not give any answer to the above mentioned question. This indicated that some respondents did not understand the question posed. 23% stated that they would continue to view the webpage regardless of any firewall alert. 19% stated that they would open the website if they knew the website was legitimate but would close it if unsure. 15% stated that they would close the webpage immediately and block the URL. 26% stated that they would investigate the webpage using security facilities such as a firewall, antivirus or anti spyware software. Additionally 2 respondents stated that they would research the alert using an online search engine. 2% of respondents claimed that they would attempt to view the webpage on another computer, thereby placing another computer at risk rather than their own.
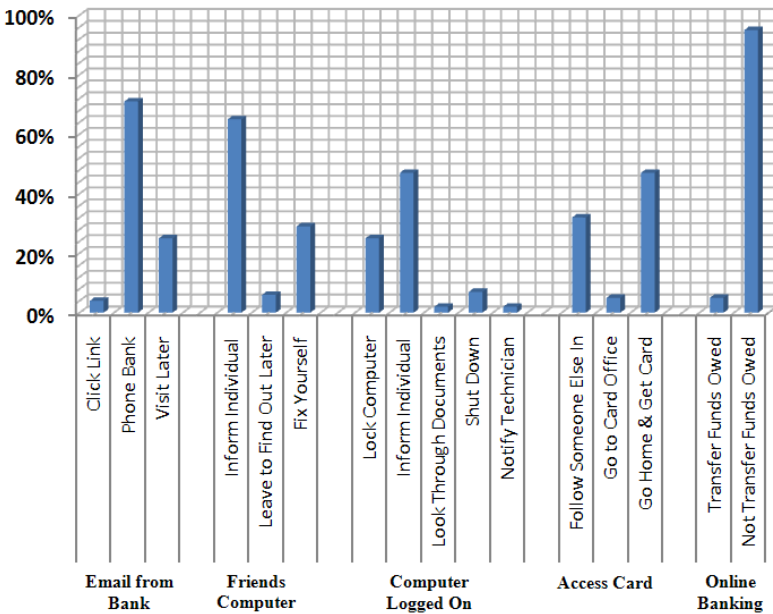
Figure 2: Security Awareness Results

Figure 2 shows the responses to the questions detailed in Table 1. The majority of respondents were able to correctly respond to situations which required an awareness of security and individual integrity. 32% claimed that they would follow another employee into a building in the event of leaving their access card at home. This result would suggest that a number of individuals do not understand the need for physical security. Direct social engineering attacks are successfully executed by a person claiming to be who they are not. Physical security and identity cards are a crucial counter measure in helping to prevent such attacks.

5.2.4. Social Engineering

The results shown in Figure 3 show a distinct lack of awareness amongst respondent demographics regarding phishing based attacks. 59% of respondents incorrectly identified the eBay security email as legitimate and 69% incorrectly identified the genuine eBay PowerSeller email as being a phishing email. The results were further analysed and it was found that respondents from undeveloped countries answered more favourably than those from developed countries. In addition students of the University of Plymouth who had previously studied one or more security modules performed worse than students who did not.
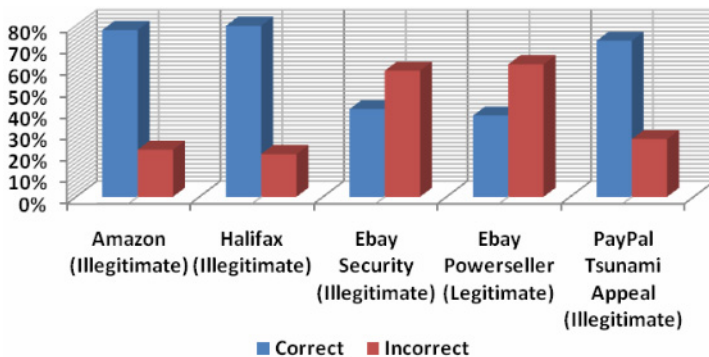
Figure 3: Social Engineering Results

5.2.5. Social Networking Websites

Out of the total 86 respondents 78% were members of one or more social networking websites leaving 22% who were not. The results in Figure 4 support the findings of previous researchers in that end users join social networking sites and post personal and sensitive information online. A small number of respondents were even prepared to post critically sensitive information such as their mother's maiden name (5%) and credit card details (2%) online.
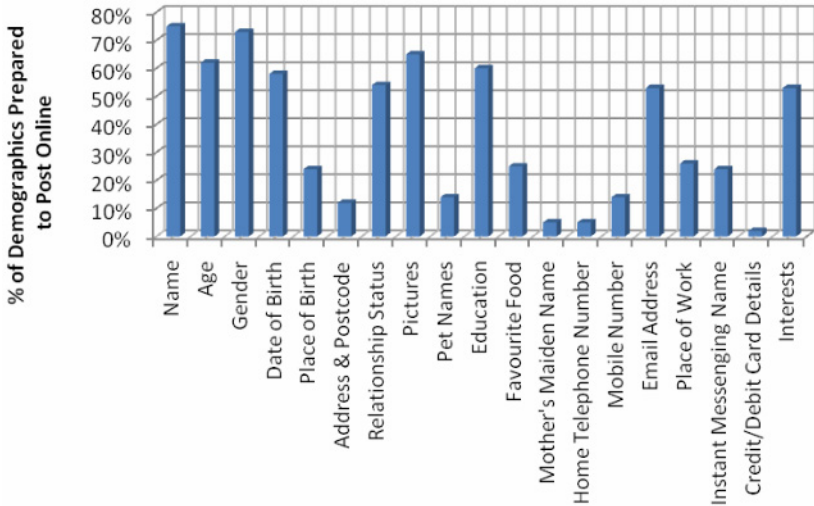
Figure 4: Social Networking Websites

6. Conclusions

This paper provides significant evidence that people are vulnerable to exploitation due to a lack of awareness of security issues. The results revealed that individual factors such as age and gender did not particularly influence demographics responses. Indeed none of the respondents were able to correctly identify all of the social engineering vulnerabilities despite the majority of demographics being educated to postgraduate level.

Demographics responses to the computer security and security awareness sections were promising and showed an improved level of awareness. The majority of respondents appeared to understand the need for essential security and could be trusted in a position of responsibility.

The responses to the social engineering and social networking websites however were more concerning. The results suggested that end users had problems differentiating between genuine and phishing emails. In addition it was clear that demographics were not aware of the potential consequences of carelessly posting personal and sensitive data online. The aim of this report was to assess people's vulnerabilities with regards to personal and sensitive data and the results have indeed facilitated a conclusive outcome that awareness raising strategies need to be implemented in order to safeguard people from exploitation.

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Online Gaming: An Emerging Avenue for Exploitation?

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Abstract

Some may argue that the proliferation of personal computers together with the widespread use of the Internet has brought many benefits to society. The popularity of the Internet and its associated online services continues to grow at an exponential rate and consequently, so does the number of avenues for potential exploitation. Prior research has already established that sexual predators and social engineers use the Internet as a means to target and exploit individuals. Indeed, previous studies highlight the significant threats faced by users of instant messaging and social networking facilities. Online role-playing games and virtual environments such as World of Warcraft and Second Life provide yet another platform for users to interact with one another. Evidence suggests that subscribers of such services often become so immersed in such fantasy worlds that their ability to differentiate between the virtual and real world is reduced. This paper investigates the level of threat faced by heavy users of 3D virtual environments and online role-playing games to potential social engineering exploits. The study made use of an online survey to assess the current level of awareness and understanding amongst individuals who spend excessive amounts of time engaging in such environments.

Keywords

Online Role Playing Game, Exploitation, Social Engineering, Online Abuse

1. Introduction

Personal computers are used by billions of people in all aspects of their personal and professional lives. The Internet has facilitated worldwide networking as well as providing 24 hour access to a plethora of information and services. Indeed, Massively Multiplayer Online Role Playing Games (MMORPG's) is one such service that has witnessed unprecedented, global growth over the last five years. According to Elliot (2009) online gaming accounted for approximately 50% of the overall growth of Internet usage in 2008. One notable example is World of Warcraft with 11.5 million subscribers and a stable annual growth rate of 12-13%, excluding aberrant phases such as periodic expansion pack releases (WorldIV, 2009).

Furnell (2008) and Öqvist (2009) suggest that the rapid adoption of these online services, in particular MMORPG's has not been matched by a corresponding embrace of security culture. Previous studies have highlighted the vulnerabilities

inherent in online interaction and organisations aim to protect children from online abuse and potential harm through awareness raising campaigns. Get Safe Online provides information to individuals on how to protect their PC and how to identify safe and secure websites (Get Safe Online, 2009), whilst the Child Exploitation and Online Protection Centre (CEOP) works collaboratively with the Virtual Global Taskforce (VGT), to help protect children from sexual exploitation (CEOP, 2009; VGT, 2009).

It is commonly acknowledged that MMORPG's provide subscribers with an interactive, convenient entertainment platform in which they can engage in a fully immersive fantasy world. In addition, the majority of online games provide users with a platform for worldwide synchronous communication, and thus enabling the compilation of online based communities of like minded individuals (Manninen, 2001). Studies have shown that synchronous interactive online environments such as games, virtual reality environments and instant messaging facilities promote the development of personal friendships and relationships whereas asynchronous communication services such as social networking websites, forums and blogs focus on the wider community (Oqvist, 2009).

The popularity of online gaming continues to grow at an unprecedented rate and this is reflected in the revenue generated by software vendors. Indeed, Blizzard/Activision reported to have generated $5 billion of revenue in 2008 (Blizzard/Activision, 2009). Moreover, research has revealed that individuals and third party websites trade developed and experienced World of Warcraft characters for sums of up to £700. Theses high stakes combined with the ever increasing popularity presents the motivation and potential for online gaming accounts to be compromised. Indeed, key loggers have become common place in online gaming environments and forums in order to capture login credentials and steal user accounts.

The popularity of the global gaming world combined with the commonly acknowledged threats of identity theft, extortion and paedophilia, highlights the level of threat that online gaming subscribers continue to be faced with. This paper assesses the extent of human vulnerability to social engineering through excessive online gaming.

2. Social Engineering in Context

The protection of personal and sensitive data has previously been allied with technical based security measures. However, it is becoming increasingly apparent that technical solutions alone will not solve the problem and that people are typically the weakest link in the security chain (Rabinovitch, 2007). As people are now classified as the weakest link, it is important to ensure a high level of education, awareness and behaviour amongst individuals in order to maximise the protection and security of personal and sensitive data (Mitnick, 2002). Differing personalities inherently bring with them various potential vulnerabilities. These vulnerabilities are often exploited using one or more social engineering exploits.

According to Papadaki et. al, (2008), exploiting human weaknesses to perform atypical actions or divulge confidential information has become a long standing problem in the security domain. Moreover, with the implementation of modern security technologies, attackers find exploiting human vulnerabilities more effective and efficient than conventional technological hacking (Twitchell, 2006).

Limited protection can be implemented to protect a user from feeling gullible to divulging information. Unlike physical network infrastructures, no patches or security policies can be applied to improve and protect against human misjudgements.

The social engineering phenomenon is nothing new. Fraud has been in existence for decades with large scale Phishing attacks dating back to 2003 (Furnell, 2008). Cyber criminal activity has become more prevalent over the last five years and numerous investigations have been conducted exploring the avenues in which human vulnerabilities are exploited using different social engineering based attacks (Tipton & Krause, 2003). In the context of this paper the focus is on interactive online gaming environments.

3. Social Impact

It is commonly acknowledged that rapidly emerging technologies such as social networking websites, online blogs, online games and mobile telephones have had a considerable impact on the way in which individuals communicate (Öqvist, 2009). Indeed a study by Hobson (2008) revealed that 1 in 10 Britons use their Internet connection to communicate with friends on Social Networking Services (SNS) such as Bebo, Facebook and Myspace. Salz (2006), points out that these emerging forms of online collaboration and social networking have perhaps facilitated the biggest change in communication within a century.

Cohen (2009) argues that many users of the above mentioned services become easily addicted. In a self reflective report, Cohen describes how his addiction to online blogging increased exponentially after the deletion of his Twitter and FriendFeed accounts.

Evidence suggests that as a society we are witnessing an increase in social and psychological dependencies to online communication services. Davies (2007) suggests that the Internet has provided a platform for cheap, worldwide communication, offering support and easy interaction and that the majority of human beings need social interaction to stimulate happiness and social networking services, text messaging and online blogging help to satisfy that need. Joinson (2002), states that many individuals have a psychological craving for social interaction and in many cases this manifests itself in the development of online friendships and relationships. Griffiths (2000) highlights the degree of anonymity afforded by online services and states that this encourages participants to be more expressive than in normal face-to-face interaction; bringing with it positive and negative social implications.

4. Addiction

The term 'addiction' has been the subject of much research. Young (1997) states that addiction can be divided into two sub categories: substance addiction and behavioural addiction. In a preliminary study by Young (1996), a criteria framework for behavioural addiction was adapted from a pre-existing framework used in the American Psychological Association's Diagnostic and Statistical Manual (DSM-IV) for psychoactive substance addiction. Griffiths (1998), argued that the survey based evidence for Internet addiction collated from Young's framework was remarkably thin and questionable on a number of grounds. In light of the foregoing, Griffiths (1998) developed a six point diagnostic criteria for Internet addiction as shown below.

1. *Salience*   Using the Internet dominates the person's life, feelings and behaviour.

2. *Mood Modification*   The person experiences changes in mood (e.g. 'a buzz') when using the Internet.

3. *Tolerance*   Increasing amounts of Internet use are needed to achieve the same effects on mood.

4. *Withdrawal Symptoms*   If the person stops using the Internet they experience unpleasant feelings or physical effects.

5. *Conflict*   Using the Internet causes conflict with those close to the person, or with their everyday life (e.g. their job, social life, or hobbies).

6. *Relapse*   The addict tends to relapse into earlier patters of behaviour, even after years of abstinence or control.

While much effort has gone into developing diagnostic criteria to assess the prevalence of Internet addiction, models of what makes the Internet addictive are relatively sparse. Young (1997) however argues that three aspects that make the internet potentially addictive are: anonymity, convenience and escape (ACE). This prompted Griffiths (2000) to point out that the internet itself is not addictive; it is merely a medium for which users satisfy other addictions (e.g. online gaming, gambling, pornography).

Previous studies highlight the dangers of addiction associated with online gaming and the consequential damage which has evolved from excessive engagement. Wiemer-Hastings (2005) states that behavioural addiction to online gaming can often lead to consequences such as failing school, family breakups and relationship problems.

Few studies have been conducted regarding people's vulnerabilities in relation to addiction. It is commonly acknowledged that the anonymity afforded by the internet

makes the process of exploitation more desirable. Moreover, the addictive tendencies associated with online gaming presents a clear emerging avenue for exploitation. In addition, evidence suggests that subscribers of online gaming services often become so immersed in such fantasy worlds that their ability to differentiate between the virtual and real world is reduced (Öqvist, 2009), consequently making them particularly vulnerable to attack.

5.   Online Gamers Vulnerability Study

The evidence presented thus far illustrates the potential for harm and exploitation through excessive online gaming. The purpose of this preliminary study was to measure the influence of online gaming addiction on an individual's ability to detect and respond to potential social engineering attacks.

This study made use of an online survey in which respondents were presented with 44 questions relating to their online gaming experiences. The authors recruited respondents collaboratively with leading online gaming vendors through MMORPG forums. In addition, the survey was also promoted through the British Computer Society, the University of Plymouth, the Centre for Information Security and Network Research and Online Gamers Anonymous.

5.1 Assessment Design

The survey consisted of the following six sections:

Section 1: Demographics: This section focused on the specific individual attributes of the respondent. Information such as age, gender, country of origin and employment status was collated. The purpose of this section was to understand if any of the aforementioned attributes affected demographics responses.

Section 2: Environment: The purpose of this section was to ascertain respondents' level of engagement with in house entertainment. Respondents were asked how many hours they spent engaging in online gaming environments and what their communication preference was.

Section 3: Online Gaming Experiences: This section focused specifically on online gaming and assessed respondents' levels of addiction to MMORPG's. The questions were developed in accordance with Griffith's (1998) behavioural addiction framework which facilitated a meaningful analysis.

Section 4: Online Interactivity: This section focused on respondents' online interactivity and sought to establish levels of peer-to-peer engagement. The questions enabled identification of previous and potential social engineering vulnerabilities.

Section 5: Participants Experiences and Advice: Respondents were invited to provide relevant advice, tips and share any positive and negative experiences related to online gaming.

Section 6: Follow-up Discussion: Respondents were invited to participate in a follow up case study and leave their first name and email address in order to discuss their experiences and answers further. This enabled the principal investigator to gain a more qualitative insight into individual reasons for excessive online gaming habits.

5.2 Results

5.2.1. Demographics

The survey assessed a total of 562 respondents regarding their online gaming experiences and their consequential abilities to detect and responded to social engineering attacks.

86% of respondents were male and 14% female. 48% of respondents were aged between 18-21, 29% aged between 22-29, 16% aged between 30-39, 5% aged between 40-49, 2% aged between 50-59 and 1% aged 60 years old or more. 88% or respondents originated from developed countries leaving 12% from undeveloped countries. 96% of respondents currently reside in developed countries highlighting that 8% of the survey population moved from an undeveloped to developed country.

At the time of conducting this study, 35% of participants were employed on a full basis, 10% employed on a part time basis, 45% were University/Higher Education students, 9% were unemployed leaving 1% who were retired.

5.2.2. Environment

52% of respondents had 3 or more computers in their household and 64% had 1 or more games consoles. 100% of the surveyed participants had broadband or fibre optic internet at home. 75% preferred to play computer games over watching television and 21% did not have a preference. Of the total 368 respondents who preferred to play computer games, 78% stated that their main motivation for choice was the greater level of interactivity offered by online games. In addition, 44% like to be in control of a character and 64% like the thinking and responding aspects of gaming. Interestingly, almost half (47%) of the 562 respondents preferred playing offline based games, 29% preferred online role playing games leaving 24% with no preference. Of the total 17 respondents who preferred to watch television, 47% stated that they enjoy passive relaxation and 35% enjoyed being close to other family members when at home.

59% of participants' preferred synchronous communication with friends and acquaintances (i.e. voice telephony - 12% and face to face - 47%) leaving 41% who preferred asynchronous communications such as internet messaging (36%) and SMS text messaging (5%). 78% stated that their chosen method of communication has always been the same. Of the 22% who had changed their preferred method of communication, many respondents found internet technologies (e.g. VoIP, instant messengers, online games) cheaper, quicker and less pressurised than more traditional communications. In addition, several respondents stated that the anonymity aspect of asynchronous internet based communications enabled them to

become more confident and expressive. These results compliment the underlying theories of Griffiths (2000) (see section 3).

All of the surveyed respondents engaged with an internet service on a daily basis. Daily activities included playing online games (87%), web browsing (93%), instant messaging (67%), work related research (60%), online shopping (22%) and downloading multimedia content (61%).

Table 1 shows the total number of hours spent online each weekday (including time spent online at work/college/university) and during the weekend (at home). Table 2 shows the total number of hours spent playing online games each weekday and during the weekend (at home).

Hours	Per Weekday	Weekend		Hours	Per Weekday	Weekend
1 - 4	13%	11%		1 – 2	22%	12%
5 - 9	37%	32%		3 – 4	37%	23%
10 - 12	20%	21%		5 – 6	22%	23%
12+	30%	36%		7 – 8	8%	18%
				9+	11%	24%

Table 1: Total hours spent online **Table 2: Total hours spent playing online games**

As shown in table 1, 60% of respondents spend more than 10 hours online per day during a working week and 57% spent more than 10 hours online at weekends. Table 2 highlights the levels of MMORPG engagement amongst respondent demographics. Indeed, 41% spent 5 or more hours playing MMORPG's each weekday and a quarter (24%) spent 9+ hours playing online games over a given weekend.

5.2.3. Online Gaming Experiences

This section began by asking respondents to list all of the games they played on a weekly basis. Of the 412 respondents, the most widely played MMORPG game was World of Warcraft (81%), followed by Call of Duty (8%). Other online role playing games such as CounterStrike (5%), Diablo (2%), Star Wars Galaxies (2%), Lord of the Rings (1%) and Final Fantasy (1%) were also mentioned. In addition, almost half (45%) of respondents played online games 7 days a week with 42% engaging in MMORPG's between 4 and 6 days a week.

The aim of this section was to measure the levels of addiction inherent in the respondent demographics. This was achieved by asking 26 questions that could be effectively benchmarked against the six point addiction criteria developed by Griffiths (2000) (i.e. salience, mood modification, tolerance, withdrawal symptoms, conflict, and relapse). Participants could select one of the following options to each of the 26 questions: 'All of the Time', 'Sometimes', 'Not at All'. Table 3 shows the questions presented to participants and figure 1 show the results obtained. In addition, figure 2 shows the varying levels of behavioural addiction amongst the participants.

No.	Questions
1	I sometimes find myself arguing with other members of the family because of me playing my game
2	I often find myself in arguments with other family members wanting to use the computer
3	I prefer to socialise with friend's online than to social with friends offline
4	I feel a sense of excitement whilst playing the game
5	I feel a sense of control and enjoy the feeling of success and power when playing the game
6	It is one of my main aims in life to be really good at playing the game
7	I have tried to cut down the amount of time I spend online but find that I still play it as much as before
8	When I am not playing the game I often find myself thinking about the next time I am going to play it
9	I sometimes miss meals because I am too busy playing the game
10	I am sometimes late for appointments/work/school because I am too busy playing the game
11	The game is unimportant in my life
12	I feel that I could live happily without playing the game ever again
13	I find the games I play an exciting discussion topic and often find myself involved in conversations offline
14	I often find myself spending more money than I can afford on the game
15	I enjoy the challenge of learning how to play the game better
16	I find that my social life has at times suffered as a result of playing the game
17	I feel that the game is the one of the most important aspects in my life
18	I find interacting with friends online much easier than interacting with friend's offline
19	Whenever I use a computer for something other than gaming I find myself wanting to play the game
20	I tend to want to spend increasing amounts of time playing the game
21	I often find myself staying up until late in the evening playing the game
22	I feel I would become irritated and annoyed if I could not play the game for more than a few days

Table 3: Online Gaming Experiences
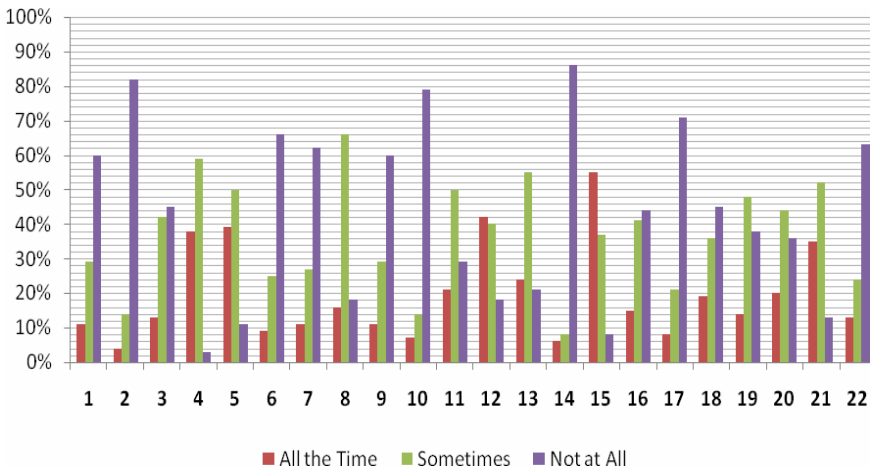
Figure 1: Online Gaming Experiences Results

Table 3 and Figure 1 illustrate that a significant number of respondents show are addicted to MMORPG's. 18% of respondents felt that they could not live happily

without playing their game and 82% often felt themselves thinking about their game when not actually playing it. In addition, 79% felt the game was important in their life and over half (56%) felt that their social life had been affected as a result of playing online games.

Many respondents showed an increase of tolerance levels as a result of playing the game. Indeed, 64% found that they spent increasing amounts of time online and 87% frequently found themselves staying up playing late into the evening.

Over half (55%) of the respondents stated that they found interacting with friends online far easier than offline interaction and this outcome supports Joinson's (2002) theory of individuals craving social interaction and consequential development of online friendships and relationships.

Of the 562 respondents only 12% found themselves spending more money than they could afford on MMORPG's, however over a quarter (28%) of respondents felt that their game was the most important aspect of their lives. In addition, just over a third (34%) claimed that becoming exceptionally proficient in the game was one of their main aims and priorities in their life.

The results were further analysed against Griffiths' (1998) six point behavioural addiction criteria and the results are detailed in figure 2.
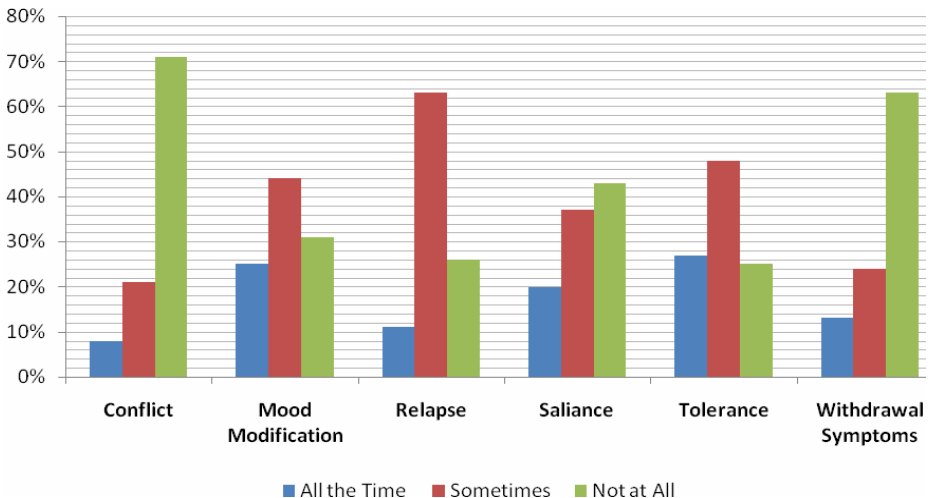
Figure 2: Six Point Behavioural Addiction Criteria Results

Figure 2 suggests that many of the surveyed respondents were behaviourally addicted to MMORPG's. Notably, almost a third was experiencing an increase in tolerance levels on a daily basis and the evidence suggests that a quarter of respondents were suffering from constant mood modification. In addition, 63% often found themselves relapsing when trying to cut down the amount of time playing MMORPG's.

A further aim of this section was to stimulate self reflection amongst participants regarding their online gaming experiences. The study used the following four questions in order to understand respondent's awareness and attitudes to their online gaming habits.

No.	Questions
1	I do not feel I am 'addicted' to the game
2	I find that playing the game is more exciting than going out with friends
3	I do not see a reason to cut down the number of hours I spend playing the game
4	I do not think about the game when I am not playing it
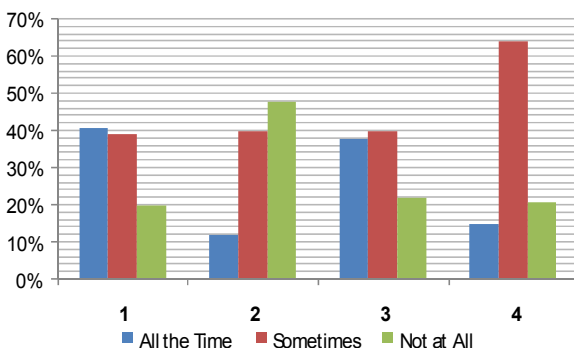
Table 4: Self Reflective Questions

Figure 3: Self Reflection Results

As illustrated in figure 2, the self reflection questions produced varying results. 20% of respondents openly admitted that they were addicted to MMORPG's, 39% were unsure, leaving 41% who believed they were not in any way addicted. Moreover, 22% of respondents felt a need to reduce the number of hours spent playing MMORPG's and 38% did not believe they were spending excessive amounts of time playing online games.

The final aim of this section was to establish the impact of online gaming on participant's lifestyles. 50% of respondents were actively involved in sports or other activities outside of the home/workplace however 20% of these participants felt that the time spent partaking in recreational activities had been affected by their online gaming. 40% of participants stated that they were previously involved in recreational activities; however, their reasons for stopping were varied. Common reasons included: lack of time, change in health conditions, pressure of job and most importantly, the convenience of online entertainment.

5.2.4. Online Interactivity

This section began by establishing who and how online gamers interact with. Over half (53%) of the respondents stated that they mainly interact with friends they have met online and 94% work collaboratively with other anonymous players to complete tasks, gain new powers and achieve higher levels within the game. Moreover, 96% of respondents talk to fellow players about matters which are not relevant to playing the game.

80% felt that they had formed close friendships with people whilst engaging in MMORPG's and 44% of these friendships were purely online based. In addition, 57% of respondents had been asked by online based friends to meet in person.

86% of participants had been asked to divulged personal and sensitive data whilst engaging in MMORPG's. The most commonly requested information included age (76%), location (75%), name (65%), and email addresses (50%). 41% of respondents had received requests for personal pictures, 38% were asked about their relationship status and 21% had been asked to divulge their telephone numbers. In addition, 10% of respondents were asked to reveal their passwords, 24% their place of work and 7% family details such as their mother's maiden name.

89% of respondents had previously divulged personal and sensitive data within a MMORPG environment. Data such as age (81%), location (77%) and name (67%) were the most common with other types of information such as relationship status (35%), email addresses (48%) and places of work (25%) that had also been divulged. 38% of the surveyed participants sent personal pictures to online friends upon request and 22% have previously disclosed personal telephone numbers. Alarmingly, 10% admitted to divulging passwords within online gaming environments and 7% have previously given out family details such as their mother's maiden name.

45% of respondents had previous become suspicious of one or more other players in a MMORPG environment. Typical suspicions included, stealing of online game currency, online stalking, sexual harassment, social engineers, paedophiles, bad language, aggressive arrogant rude behaviour, request for face-to-face meetings, spamming and racist comments.

5.2.5. Participants Experiences and Advice

The information and advice proffered from the survey participants was somewhat varied. Many respondents acknowledged that online gaming has negatively affected their real world social interaction and many feel that they have become withdrawn, depressed. In addition, when presented with a chance to freely express themselves many participants acknowledge that they spend an excessive number of hours engaging in MMORPG environments. The aforementioned acknowledgements are contradictory to the results obtained in the self reflection questions in section 5.2.4 suggesting that participants proffered more qualitative data than when faced with the closed questions. Other participants noted that online gaming is a convenient and easy form of social stimulation and entertainment, however, many respondents admitted that they have previously neglected their friends, family and children due to online gaming. Some even reported that they lost their jobs, homes and families as a result of excessive engagement. Positive aspects included meeting new people from a diverse range of cultures, forming of new friendships and relationships and developing hand to eye co-ordination.

6. Conclusions

This paper provides clear evidence of the dangers associated with excessive online gaming. Indeed, the above evidence suggests that a subscriber to MMORPG's can become easily addicted and such addictions are having a detrimental effect on an individual's real world social life. In addition, the results suggest that there is a

distinct lack of awareness regarding personal privacy within online gaming environments. This paper argues that the addictive nature of MMORPG's combined with a lack of awareness of the need for the protection of personal and sensitive data presents an emerging avenue for exploitation. Indeed the following anecdotal statement proffered by a surveyed participant highlights the need for information security awareness within online gaming environments:

"Someone asked to meet me who lived near my suburb. I met him randomly in World of Warcraft and he was very nice, but then he wanted to meet up after we had chatted for only a few hours (and exchanged photos/chat on Ventrilo). He was also really hot and I would have loved to go to his house but it was too weird, but he was respectful and stopped messaging me after I said no (to you know what). And a certain player I know of, he's a Guild Master. In his guild, if you want him to do something for you, then you need to send him pictures of your genitals (male only). He 'bids' on your offer of sexual images and offers gold. Extremely creepy, sounds very strange over microphone and has very, VERY weird discussions with people on Ventrilo. I know of him through Offline friends who joined his guild, they found it very funny"

Previous studies have highlighted the excessive number of hours game play required to reach a level in which users can participate in 'Player versus Player' (PvP) and Player versus Environment' (PvE) combat. This addictive catalyst combined with real world social pressures supports the level of addiction inherent in many MMORPG subscribers.

The participant experiences provided a valuable insight into the myriad of positive and negative implications associated with online gaming. Indeed, the principal investigator intends to re-run the same study with minors aged between 12 and 18 years old in order to establish the level of addiction inherent in teenagers and the consequential vulnerabilities associated with youngsters engaging and interacting with MMORPGS's.

Respondents were invited to participate in a follow-up discussion regarding their online gaming experiences and related survey responses. Of the total 562 responses collated thus far, 260 people (46%) have agreed to be contacted further. The qualitative responses collated from the intended follow up discussions will help in the building of an effective awareness raising framework to manage online gaming experiences.

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Implications and Risks of MMORPG Addiction: Motivations, Emotional Investment, Problematic Usage and Personal Privacy

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Abstract

The omnipresence of technology combined with the widespread embrace of online communication has undoubtedly created a subculture of 'always on'. Indeed, experts have revealed that online interaction and information invokes a 'dopamine squirt' similar in effect to that of narcotics abuse. Prior research has established that online interaction through computers and mobile devices gives the feeling of self importance and provides an illusionary short term fix for seemingly isolated individuals. This paper investigates the levels of addiction to Massively Multiplayer Online Role Playing Games and the potential information and social based ramifications associated with such environments. The study made use of an online survey and follow-up case study evidence to assess current levels of addiction and associated security awareness amongst 362 online gamers.

Keywords

MMORPG, Exploitation, Social Engineering, Persuasion, Behavioural Addiction

1. Introduction

The internet is now ubiquitous. Its popularity stems from the fact it is, in essence, a medium of communication for electronic devices. Indeed, evidence suggests that the omnipresence of current communicative technologies has created a subculture of "always on". Indeed, Ritchel (2003) theorises that the constant stream of data can not only hinder productivity and disrupt family time but can in many cases become an addiction which is very hard to switch off. In addition, recent studies have revealed that technology addiction amongst children has a disruptive effect on learning (Kakabadse et. al., 2009).

With the rapid development and evolution of new online applications and activities comes a potentially unique, and possibly unpredicted, new psychological impact (Joinson, 2003; Wallace, 1999). In recent years we have witnessed the rapid development and global embrace of Massively Multi-player Online Role Playing Games (MMORPG's). An MMORPG is a video game genre capable of supporting thousands of users simultaneously. By necessity, they embrace the internet as a communication medium and feature at least one persistent world. This type of game

is typically accompanied by external forums, synchronous chat facilities, clans and guilds (Gladwell & Currie, 2009).

It is the only existing naturalistic setting in which millions of users voluntarily immerse themselves in a graphical virtual environment to interact, collaborate and form relationships with one another though customised avatars (Yee, 2006; Woodcock, 2003).

In the succeeding section the structure and evolution of MMORPG's will be discussed together with the differing end user motivations and emotional investment. This paper then presents the findings of survey and case study research into 362 online gamers.

2. Evolution of MMORPG's

MMORPG's evolved from Multi-User Domains (MUD's). Traditional MUD's consisted of online environments in which multiple users could interact with each other and achieve structured goals. The development MMORPG's was facilitated by the advanced graphical and processing capabilities offered by personal computers combined with the widespread uptake of broadband internet connections in the home environment (Öqvist, 2009). The primary distinguishing factor between MUD's and MMORPG's is the number of users that can interact concurrently within the same environment. One notable example is World of Warcraft which has some 11.5 million subscribers (WorldIV, 2009).

MMORPG's provide subscribers with a graphically rich, fully immersive 3D fantasy world in which like-minded users can interact and collaborate to accomplish complex tasks (Manninen, 2001). Indeed, gamers can choose from a set of professions or roles that the MMORPG provides and the permanence and fluidity of roles varies depending on the design of the environment. Each role has varying strengths and weaknesses and many MMORPG environments force users to collaborate in order to achieve certain goals (Yee, 2006).

It is commonly acknowledged that modern online gaming environments are infinite both in terms of size and ending. Goals and rewards typically use a random ratio reinforcement schedule based on operant conditioning (Joinson, 2003; Yee, 2006). Hence, early achievements are quick, almost instantaneous; however as a player progresses in the game the amount of time, effort and level of complexity is increased until progression becomes almost imperceptible.

The MMORPG market has witnessed unprecedented global growth in the previous five years, with such services accounting for approximately 50% of the overall growth of internet usage in 2008 (Elliot, 2008). These business opportunities, however, do not lie solely with international software vendors. Skilled players are capitalising on the popularity of MMORPG's resulting in skilled and experienced World of Warcraft characters being traded by individuals for sums of up to £700 (Sanders et. al, 2009).

The realism of MMORPG graphics continues to grow more sophisticated, contributing to the seductive, captivating appeal of the game and the likelihood of prolonged excessive engagement. Indeed, this captivating appeal is otherwise described as 'stickiness' or 'flow' (Lee, Lu & Lin, 2007; Wu, Li & Rao, 2008). The concept of cognitive 'flow' predicts an experience that completely engages an individual (e.g. MMORPG's) and creates the conditions conducive to maintain such a 'flow'. Moreover, such an immersive environment creates a highly pleasant and desired experience encouraging gamers to repeatedly engage in a particular games (Gladwell & Currie, 2009).

In addition to the seductive appeal of naturalistic graphical environments, MMORPG's are played in real time, requiring participants to remain online for excessive periods of time in order to keep up with the action. Indeed, the previously mentioned increase in time, effort and complexity encourages users to engage in such environments for literally hours and days as they compete with themselves and other opponents to achieve higher ranks or beat previously attained scores (Yee, 2006, Sanders et. al., 2009, Öqvist, 2009). Recent studies have highlighted the potential addictive aspects of MMORPG design infrastructures and press articles have revealed the impact of pathological internet use (Bell, 2007, Yee, 2006, Griffiths, 2000).

3. Motivations

Having examined the appealing characteristics of MMORPG's, it is important to understand the motivations behind an individual's initial engagement with MMORPG's. Prior studies together with the succeeding evidence contained herein exposes the varied and multi-faceted reasons for why users engage in MMORPG environments.

It is worth noting that the diversity of age ranges has increased exponentially with the evolution of MMORPG's. Data from studies undertaken by Yee (2006) and Griffiths (2003) challenge the stereotype that only adolescents engage in online environments and that the interaction with online games differs between adolescents and adults. Yee's (2006) study revealed the average age of respondents was 26.57 (n = 5509, SD = 9.19); the medium was 25, with a range from 11 to 68. Therefore only 25% of MMORPG subscribers were teenagers.

In studies by Chak and Leung (2004); Chou and Hsiao (2000); Meerkerk et. al. (2006) users who were classified as pathological online gamers reported lower self-esteem, increased loneliness, increased depressive and suicidal ideation, increased shyness and external locus of control. Bell (2007) points out that anxious, lonely or depressed people often attempt to alleviate their distress by seeking online resources (including MMORPG's) for entertainment, social interaction and sexual gratification.

Initial motivations for engaging in MMORPG environments do not always evolve through depression, loneliness or a lack of self-esteem. Indeed, the following responses from surveyed respondents highlight the differing motivations:

"I first became interested at school as all of my friends played World of Warcraft. It's a convenient, easy and varied form of entertainment. There is not much to do in the area I live in." [Male, 18 - 24]

"I feel important and valued when I play EverQuest. People listen to me and take notice of what I have to say. Nobody judges you on your looks or way you dress. Everybody is equal and respected." [Female, 18 - 21]

"I enjoy socializing with like minded people. We all have something in common and I found communicating with people online much easier than with people offline" [Male, 25-29]

"I have played MMORPG's with my wife for nearly two years. We take different roles and approaches in game. My wife is more passive where as I am more active and adopt more of a leadership role. We have developed more ways of communicating together" [Male, 30 - 39]

Joinson (2003) notes that individual personalities are inherently different and consequently embrace computer mediated communication (CMC) platforms (such as MMORPG's) for different reasons and in different ways. As such this is a crucial factor when attempting to determine both the effect of the internet on mental health and how and why a user interacts and behaves in a given way.

Yee (2006), dissected individual motivation into the following five factors:

Relationship factor: measures the desire of users to interact with one another and form meaningful relationships that are supportive in nature and in many cases induce disclosure of real life problems.

Manipulation factor: measures the degree to which users objectify and manipulate other user for their own personal gain and satisfaction. Such players often enjoy deceiving, scamming, taunting and dominating other users.

Immersion factor: immersive users enjoy the fantasy world environment of MMORPG's as well as being another person. They enjoy the story-telling aspect of the game as well as the histories that extend and tie in with the story of the game.

Escapism factor: measure the extent to which a user embraces a virtual environment to temporarily avoid, forget about and escape from real-life stress and problems.

Achievement factor: measures the desire to become more powerful within the virtual environment through the achievement of goals and the accumulation of items that confer power.

"It is an easy way to escape the stress of the real world. The more stress I have in life the more I want to retreat into the game." [Female, 30 – 39]

In addition, Yee (2006) also found that males scored higher than females on achievement and manipulation, whereas females scored significantly higher on the relationship, immersion and escapism factors. These findings indicate that motivations differ between genders with males engaging in MMORPG environments to achieve objective goals in contrast to females who engage in such environments to form relationships and become immersed in a fantasy environment.

Yee's (2006) study supports the theory of 'attachment style' (Haidt, 2007). The 'attachment style', in essence, refers to the fact that as humans, we have the fundamental need to feel wanted, loved, valued and cared for. Moreover, if the aforementioned needs are not adequately satisfied, this can lead to feelings of isolation and depression.

Albeit different users engage in MMORPG environments for different reasons, studies suggest that children and adolescents participate in online gaming worlds for similar reasons as those mentioned above. Bowlby (1988) states that children's behaviour is guided by two basic goals: safety and exploration. His theory was based on the concept that a child who stays safe ultimately survives and a child that explores develops the skills and intelligence needed for adulthood. These two opposing needs are then regulated according to the level of ambient safety.

Evidence from prior studies (e.g. Bell, 2007; Lee, Lu & Lin, 2007) suggests that MMORPG environments can satisfy the basic emotional needs outlined by both Haidt, (2007) and Bowlby (1988). It is commonly acknowledged that MMORPG environments provide subscribers with a second identity in which they can feel powerful, valued and respected.

In the case of children, naïve parents often advocate their children's engagement in MMORPG's as they seemingly provide cheap, convenient entertainment, in which children can explore online in the safety of the home environment. However this common misperception could not only be detrimental to a child's education but also to mental and physical safety (Öqvist, 2009).

"It's safer than going out on a Friday/Saturday night, i.e. no physical harm when playing online. Plus it's a lot cheaper" [Male, 18 – 21]

It is commonly acknowledged that, in some cases, the motivations for online interaction are malicious. From paedophilia to online fraud, the art of social engineering, manipulation and deception provide malicious individuals with the tools to exploit end users (Öqvist, 2009; Sanders et. al., 2009).

4. Emotional Investment

Evidence suggests that emotional investment in gaming has exponentially evolved with the development of MMORPG environments. Yee (2006), states that the majority of subscribers to such services classify the game as one of the most important aspects of their life. Joinson (2003) adds that the affordances of MMORPG synchronicity combined with visual anonymity encourages likeminded

users to become more expressive in such environments. In addition, the majority of MMORPG subscribers adopt a pseudonym, thereby increasing the level of overall anonymity.

Walther (1996) describes communication within MMORPG's as hyper-personal; due to the nature of the communication channel, interactions are more intimate, more intense and more salient. Firstly text based communication within such environments enable the sender to optimise their self-presentation. Secondly, the receiver then forms an inflated view of the sender due to the few optimised pieces of information transmitted. Thirdly, due to complete anonymity and the consequential lack of true visual presentation (e.g. body language) users perceptions of one another are purely based on the cues transmitted in text format (Joinson, 2003). Hyper-personal interaction invokes more personal and intimate communication between individuals which naturally induces idealised impressions through reciprocity. As the levels of intensity and intimacy accumulate, so does the desire to spend increasing amounts of time online.

Yee (2003) suggests there are factors unique to MMORPG environments that facilitate the formation of relationships. As stated in preceding sections of this paper, collaboration and trust is required for achievement of many complex in-game goals and thus these scenarios initiate and nurture the building of relationships. In addition, the mythical and chivalric romance embraced in many MMORPG's (e.g. a 'knight in shining armour') further exacerbates the levels of hyper-personal interaction.

The preceding distillation of in-game communication by Yee (2006) and Walther (1996) provides an insight into why and how relationships evolve more rapidly online than offline. The aforementioned theory of self-presentation also provides the fundamental basis for exploitation and this is discussed in the final sections.

5. Problematic Usage and Addiction

Many conceptual frameworks and theories have been developed in relation to 'internet addiction' (Young, 1998, Beard & Wolf, 2001, Ko el. al, 2005), but Griffiths (1998) points out that the internet is merely the communication medium on which other addictions are fulfilled. According to Griffiths (1998), addiction can be divided into two strands: substance and behavioural. Substance addition refers to the use of narcotics where as two examples of behavioural addiction are excessive online gaming and gambling. Despite the differences in definition, most of the criteria used in behavioural addiction frameworks are almost identical to those of substance addiction frameworks. Griffith's (1998) developed a six point criteria framework to measure behavioural addiction consisting of the following elements: salience, mood modification, withdrawal symptoms, relapse, tolerance and conflict. This framework was embraced in this study and is discussed later in the paper. The following response from one surveyed participant further illustrates the impacts of excessive MMORPG engagement:

"I feel depressed whenever I play the game, because it reminds me of all the countless hours of my life I have wasted on a non-existent world. But still I have a hard time stopping. Recently, I have started focusing a bit more on my real-life - and I've realised that 5-8 hours of gaming every day for 4 years, has affected my real-life social skills. I'm working hard on stopping 100%, but I still feel addicted at times. My real-life confidence has also faded during those 4 years, and I'm no longer a very confident boy. The hardest part was to realise that I had a gaming problem, and I only just recently admitted it for myself. It helped to talk with friends about it, and I see myself "getting better", and I have also started doing some sport again. I no longer let WoW control my life, but sometimes I get an extreme urge to play the game. One of the few good things though, is that I've met incredibly many people through wow. 95% of them are just MSN buddies, but I've met the last 5% in real life, and befriended some of them. Anyway - WoW is an incredibly addictive game, and if someone asks me if it's a good game and wherever they should start or not, I tell the truth: "WoW is without doubt a good game, but I urge you not to start playing it". In a game like WoW, you cannot become a good player without spending countless hours on the game every day and week. Playing casually isn't enough."[Male 18-24]

The succeeding sections document the studies undertaken, together with the results obtained.

Survey

The first stage of the study made use of an online survey, collaboratively recruiting participants through leading online gaming forums. The survey assessed the levels of addiction amongst 362 MMORPG subscribers and their abilities to detect and respond to exploitation attempts.

The majority of respondents were male (86%) with almost half (48%) aged between 18 and 21. 87% engaged with MMORPG's on a daily basis with 41% of respondents playing for more than 5 hours per weekday and 24% spent 9 hours or more engaging in such environments over a given weekend.

In order to determine the levels of addiction amongst MMORPG subscribers, 26 questions were compiled; each of which were benchmarked against Griffiths' (1998) behavioural addiction framework (salience, mood modification, withdrawal symptoms, relapse, tolerance and conflict). Griffiths (1998) states that for an individual to be classed as behaviourally addicted they must show signs of each of the six criteria.

Of the total surveyed population 20% openly admitted to being addicted to MMORPG's of which 17% felt that they could not give up playing on their own. This correlated with 23% of participants that were classed as behaviourally addicted in accordance with Griffiths' (1998) six point criteria framework.

Although only a quarter of the total respondents were classed as behaviourally addicted, the following statistics indicated that many of the surveyed players were

experiencing negative lifestyle changes as a result of their engagement with MMORPG environments. The key highlights are as follows:

Addictive Tendencies

29% have attempted to cut down the amount of time they spend on MMORPG's but were unsuccessful.

63% found themselves spending increasing amounts of time online.

85% frequently found themselves staying up until late into the evening playing MMORPG's.

80% often found themselves thinking about the game when they were not physically playing.

Lifestyle Impact

22% felt the number of hours spent online was unhealthy.

35% considered their MMORPG engagement as a top priority in their life.

22% have consequently missed or been late for appointments or work due to playing MMORPG's.

42% have missed meals as a result of online gaming.

Social Implications

84% believe that their online gaming habit has had a negative effect on their real world social life.

53% prefer to socialise within MMORPG environments than with real world offline friends.

52% found playing an MMORPG more exciting than going out with friends.

51% find interacting with online friends easier than conversing with real world friends.

80% had formed particularly close friendships with other MMORPG players.

96% discussed personal issues not related to game play with fellow players.

The analysis on MMORPG engagement highlighted significant levels of addiction amongst respondents. The collated evidence suggests that the aforementioned engagement is negatively impacting on player's social abilities, general wellbeing and mental health. Indeed, the results confirm the validity of Walther's (1996)

hyper-personal communication theory in that engagement within MMORPG's appear to have altered just over half of the respondents social preferences. Moreover the following responses from surveyed participants evidence Haidt's (2007) theory of 'attachment style':

"I'm a guild master in World of Warcraft. I have many good friends in WoW and we look after and protect each other. My role as guild master is important and my group members respect me and follow my command. I have met many good loyal friends online who I discuss many issues with. I play the game for several hours a day and find it a very positive social experience" [Male, 18 – 21]

In addition to the above, the following response from a parent of an online gamer further illustrates the addictiveness of MMORPG's:

"My son who is 15 is the online gamer. I completed this survey (I'm 45) to the best of my knowledge. He has become withdrawn, depressed, his grades have suffered as well as his sleep patterns, social behaviours. I have him in counselling, but he refuses to believe he has a problem. I know that he has an addictive personality and maybe borderline ADHD, because he is just like me. I believe that there is huge populations of teenagers out there just like him who are missing out on so much life because of this addiction." [Female, 45]

The evidence presented thus far provides a clear insight into the motivations, emotional investment and levels of addiction amongst MMORPG subscribers. The following section investigates personal privacy and consequential threats that users are exposed to whilst engaging in such environments.

6. Personal Vulnerabilities & Privacy Risks

Online communities are, in many cases, characterised by relatively high levels of trust (Joinson, 2003). Indeed, as Rheingold (2003) points out this provides the opportunity to deceive, violate and exploit members of such communities. From online fraud to paedophilia, computer mediated communication has provided a myriad of avenues for exploitation. Donath (1999) asserts that deception commonly occurs in MMORPG environments and makes specific reference to gender bending. Gender bending refers to individuals presenting themselves as the opposite sex online through the use of gender-neutral pseudonyms. This is further evidenced by the following participant responses:

"The negative side is that there are some people who make use of the game to look for innocent girls, trick them and abuse them." [Female, 18-21]

"One man seemed to be stalking me online. It made me feel very uncomfortable." [Female, 22-29]

86% had been asked to disclose personal and sensitive data in MMORPG environments, including age (76%), location (75%) and email addresses (50%).

41% had received requests for personal pictures.

57% had been asked by online based friends to meet face-to-face.

10% were previously asked to divulge account details including passwords.

The second phase of the study assessed the level of self-disclosure amongst the 362 surveyed participants. Understanding the level of self-disclosure provided a clear insight into the inherent level of vulnerability to social engineering and exploitation attacks. The key highlights are as follows:

89% had previously divulged personal and sensitive data in an MMORPG environment, including age (81%), location (77%), and email addresses (48%).

38% sent personal pictures to online friends upon request

22% previously divulged personal telephone numbers.

10% had divulged credentials upon request.

In addition, almost half (45%) of the respondents had become suspicious of other players behaviours whilst engaging with MMORPG's. Concerns included stalking, harassment, racism, stealing of online currency and property, and extreme aggressive behaviour.

The final stage of the study comprised of a semi-structured telephone interview with willing participants who were classified (according to Griffiths' (2000) framework) as 'behaviourally addicted'. Of the 23% who fell into the aforementioned category, 20% agreed to be interviewed. The key highlights from the follow-up case studies are detailed below:

17% felt they were addicted to their game and could not live without it.

66% stated that the games provided them with a sense of purpose and invoked a feeling of being valued and respected.

47% were either married and/or had their own family. 84% of these admitted that their MMORPG engagement had a negative impact on their family life as a whole and 8% reported that their online gaming had caused family breakup.

16% revealed that they had been subject to one or more social engineering attack. 5% of these fell victim to successful attacks including fraud and being duped into sending personal sexually orientated pictures.

38% had met online based acquaintances in person. 20% of these stated they found the real life personality of the other individual to be much different than their previous online based perception.

In addition, the following responses from the follow-up case study illustrate some of the thoughts, feelings and emotions from online gamers:

"Neglecting my wife and kids emotional needs, depression amplified by gaming" [Male, 30-39]

"Well... I can only speak from personal experience. I was addicted to World of Warcraft for over 2 years... I am a recovering online gaming addict. I almost lost my job, family and wife over my obsession. It was all I could think about, it dominated every waking moment of my conscious, (and unconscious at night) mind. After years of emotional neglect, my family had finally had enough." [Male, 21-29]

"There are very lonely people online, (I was probably one of them too). I have had times where other players have acted inappropriately towards me that they perhaps wouldn't have meeting someone in person for the first time, (i.e. making graphic comments, alluding to emotional attachments." [Male, 30-39]

7. Conclusions

The preceding evidence suggests that online gaming addiction is an ever increasing problem and Walther's (1996) theory of hyper-personal interaction can indeed increase an individual's level of vulnerability and risk of being exploited. Moreover the study revealed that for some participants MMORPG's give a sense of purpose and meaning in their lives. This compliments Haidt's (2007) theory that people need obligation, constraint and structure in order to numb the feeling of isolation. However, in many cases, this misperception changes the dynamics of individual's life and in some cases results in addiction. As the preceding evidence illustrates such additions are not only damaging to an individual's lifestyle and mental wellbeing but also increases their levels of vulnerability to exploitation. The theory of increased vulnerability is distilled from the fact that participants are typically highly trusting within MMORPG environments and the empirical evidence shows that manipulation and persuasion is a common facet of online gaming. In addition, the deep emotional investment exacerbates the aforementioned vulnerabilities.

The affordances of anonymity combined with the immersive nature of MMORPG's creates an environment on which emotion, isolation and the desire for celebrity-like status takes precedence over individual safety and the protection of personal and sensitive. It is clear that the psychological consequences of online gaming are therefore dependent on the attributes of the user and how the two interact.

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Online Addiction: Privacy Risks in Online Gaming Environments

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ABSTRACT

In this paper we investigated the levels of addiction and personal data disclosure within Massively Multiplayer Online Role Playing Game environments (MMORPG's). The study made use of an online survey which embraced a combination of a six point behavioural addiction framework, Self Determination Theory and Impression Management theory to assess addictive behaviour and consequential data disclosure amongst a sample representative of 188 Singaporean based MMORPG gamers. Results found that pathological gaming addiction had a direct effect on levels of personal and sensitive data disclosure and participants who were disclosing high amounts of data were considered more vulnerable to exploitation and predation.

Categories and Subject Descriptors

J.4. [**Computer Applications**]: Social and Behavioural Sciences

General Terms

Security, Human Factors.

Keywords

MMORPG, Gaming Addiction, Privacy, Exploitation, Self Determination Theory, Impression Management, Data Disclosure

1. INTRODUCTION

Massively Multiplayer Online Role Playing Games (MMORPG's) are fully immersive three dimensional societies in which thousands of end users can interact and collaborate to accomplish complex tasks. MMORPG's have evolved from traditional single-player games and provide gamers with a highly social environment that facilitates and promotes hyper-personal communication. These virtual worlds have created extensive global communities in which end users can meet other gamers and build reputations based on their performance and ability to meet common goals [1]. Players can create one or more visual representations of themselves known as avatars. Avatars hold different sets of professions or roles that the MMORPG provides and the permanence and fluidity of roles varies depending on the design of the environment [2].

Each role has varying strengths and weaknesses and the structural characteristics of many MMORPG's forces players to trust and become dependent on their more experienced counterparts. MMORPG environments are infinite both in terms of size and ending. Goals and rewards typically use a random ratio reinforcement schedule based on operant conditioning [3], [4]. Hence, early achievements are quick, almost instantaneous; however as a player progresses in the game the amount of time, effort and level of complexity is increased until progression becomes almost imperceptible. In addition, the realism of MMORPG graphics continues to grow more sophisticated, contributing to the seductive, captivating appeal of the game and the likelihood of prolonged excessive engagement. This captivating appeal is otherwise described as 'stickiness' or 'flow' [5], [6]. The concept of cognitive 'flow' predicts an experience that completely engages an individual (e.g. MMORPG's) and creates the conditions conducive to maintain such a 'flow'. Moreover, such an immersive environment creates a highly pleasant and desired experience encouraging gamers to repeatedly engage in a particular game [7]. In addition to the seductive appeal of naturalistic graphical environments, MMORPG's are played in real time, requiring participants to remain online for excessive periods of time in order to keep up with the action. Indeed, this increase in time, effort and complexity encourages users to engage in such environments for literally hours and days as they compete with themselves and other opponents to achieve higher ranks or beat previously attained scores [1], [2], [8]. Recent studies have highlighted the potential addictive aspects of MMORPG design infrastructures and press articles have revealed the impact of pathological Internet use [9], [10], [11].

2. EMERGENCE AND MEASUREMENT OF ONLINE GAMING ADDICTION

MMORPG addiction is currently one of the most discussed psychosocial aspects associated with playing computer and video games [12]. The emergence and acceptance of addiction to MMORPG's has grown significantly over the last decade [13], however, the conceptualisation of 'behavioural addiction' (i.e. one that does not involve the ingestion of a psychoactive drug) has long since been a matter of great debate. Any conceptualisation of addiction has implications for several groups of people (e.g. addicts, family members, researchers, practitioners and policy makers) and in some cases the needs of these groups may not be equally well served by certain models [14]. Griffiths [15] states

that excessive activity and addictive activity are two very different levels of engagement and argues that the fundamental difference between excessive engagement and addiction is that the former enhances an individual's life as opposed to the latter which is destructive. Irrespective of the terminology used, researchers generally agree that computer and videogame overuse can lead to behavioural addiction [14]. Furthermore, addictive behaviour refers to behaviour that is excessive, compulsive, uncontrollable, and psychologically or physically destructive [16].

Online gaming addiction has been identified as a specific subtype of Internet addiction [17] and although Young [13] states it is difficult to estimate how widespread the problem is, the emergence of international online gaming addiction support centres illustrate the significance and acceptance of the problem [18], [19].

Many studies on gaming addiction are based on the diagnostic criteria for pathological gambling found in the Diagnostic and Statistical Manual of Mental Disorders (DSM). Researchers have developed various different scales to measure "pathological" gaming by adapting 6 or 7 of the DSM's criteria [20-30] (i.e. salience, tolerance, mood modification, withdrawal symptoms, relapse and conflict). Young's 8 item questionnaire [31] for diagnosing Internet addiction has often been adapted in studies specifically focusing on online gaming addiction [32-35], whilst other studies have adapted the ICD-10 diagnostic criteria for pathological gambling [36]. Several studies have devised their own set of criteria for gaming addiction [37-39].

The 6 point diagnostic (adapted) DSM criteria has been extensively embraced in many studies by Griffiths [11], [15], [23], [24] and is one of the few adapted frameworks that has been fully developed and validated as a game addiction scale. Moreover, Lemmens et al. [12] used factor analysis to confirm the validity of the second-order construct. According to Griffiths [11] an individual can be classified as behaviourally addicted if they satisfy each of the following 6 criteria:

1. **Salience:** Playing a game becomes the most important activity in a person's life and dominates his or her thinking (preoccupation), feelings (cravings), and behaviour (excessive use).
2. **Tolerance:** The process whereby someone starts playing games more often, thereby gradually building up the amount of time spent on games.
3. **Mood modification:** The subjective experiences that people report as a result of engagement in games. This dimension was previously labeled euphoria [11], [15], referring to a "buzz" or "high" that is derived from an activity. However, mood modification may also include tranquillizing and/or relaxing feelings related to escapism.
4. **Withdrawal Symptoms:** Unpleasant emotions and/or physical effects that occur when game play is suddenly reduced or discontinued. Withdrawal consists mostly of moodiness and irritability, but may also include physiological symptoms, such as shaking.
5. **Relapse:** The tendency to repeatedly revert to earlier patterns of game play. Excessive playing patterns are quickly restored after periods of abstinence or control.
6. **Conflict:** This refers to all interpersonal conflicts resulting from excessive gaming. Conflicts exist between the player and those around him/her. Conflicts may include arguments and neglect, but also lies and deception.

3. PRIVACY RISKS IN ONLINE GAMING ENVIRONMENTS

Online privacy and data protection are two of the most widely discussed aspects of computer mediated communication and evidence suggests that there is an increase in social and psychological dependencies to online communication services (e.g. instant messengers, email, VoIP) [8]. Indeed, it is commonly acknowledged that the Internet has provided a platform for cheap, worldwide communication, offering support and interactive interaction amongst end-users [40].

Many studies have been conducted highlighting the identity and privacy risks associated with both synchronous and asynchronous computer mediated communication [1], however little attention has been given to privacy risks and data disclosure within MMORPG environments save for the social and lifestyle implications of pathological gaming.

Walther [41] describes peer-to-peer communication within MMORPG environments as hyper-personal and states that due to the nature of the communication channel, interactions are more intimate, more intense and more salient. Text based communication within such environments enable a sender to optimise their self-presentation which causes the receiver to form an inflated view of the sender due to the few optimised pieces of transmitted information. As a result of true visual anonymity and representation (e.g. body language) end-user perceptions of one another are purely based on the cues transmitted in text format [3]. Hyper-personal interaction invokes more personal and intimate communication between individuals which induces idealised impressions through reciprocity. As the levels of intensity and intimacy accumulate, so does the desire to spend increasing amounts of time online.

Yee [2] suggests there are factors unique to MMORPG environments that facilitate the formation of relationships. Indeed, collaboration and trust is required for achievement of many complex in-game goals and these scenarios initiate and nurture the building of relationships. In addition, the mythical and chivalric romance embraced in many MMORPG's (e.g. a 'knight in shining armour') further exacerbates the levels of hyper-personal interaction. Moreover, in-game collaboration, frequently involves peer-to-peer mentoring and exchanging of gifts (e.g. charms to advance to the next level).

Relationship development is a crucial factor in exploitation and predation [42] and the preceding evidence clearly illustrates that MMORPG environments encourage subscribers to form close, intimate and trusting relationships with fellow gamers, many of whom are in reality complete strangers. In addition, gamers often adopt gender-neutral pseudonyms for their characters, which enable the separation of real world and virtual identities but can also provide a greater level of anonymity for individuals with darker motives.

The purpose of our research was to explore a) levels of addiction to MMORPG's b) levels of personal and sensitive data disclosure within MMORPG environments and c) the resultant level of risk to MMORPG gamers. Our research also explored the correlation between addiction and data disclosure, which to date has not been investigated.

4. METHOD

4.1 Participants

The sample consisted of 188 self-selected MMOPRG players from 11 countries. All participants completed an online questionnaire in their own time. Of these participants, 74% were male ($n = 140$), 26% were female ($n = 48$). The mean age was 22.6 years ($SD = 2$ years). Of the participants who gave their country of residence, 98% were currently living in Singapore ($n = 184$), 1% in Canada ($n = 2$) and 1% in the United States of America ($n = 2$). The high proportion of Singaporean respondents could have possibly created a cultural bias. Lack of motivation and integrity in online based surveys are two potential concerns, but studies have shown that web-based respondents are typically highly motivated because of self-selection. In addition, anonymity does not have an adverse effect on data integrity [2].

4.2 Design and materials

An online questionnaire survey was designed using a browser based data collection program (Lime Survey) and was divided into 6 sections. The first section asked for information about gender, age, country of origin and current residence, level of education and number of years using the Internet in the home. The second section asked respondents where in the home their computers were typically situated and what Internet based functions were used on a daily basis.

The third section focused on addiction asking participants about their playing habits, time spent online during weekdays and weekends and the number of different avatars used in the current MMORPG game that they currently spent the most time engaging in. In addition, a 22 item Game Addiction Scale (GAS) developed by Lemmens et. al. [12] in accordance with Griffith's 6 point behavioural addiction framework [11] (salience, tolerance, mood modification, conflict, relapse, withdrawal symptoms) was used and participants were provided with a 7 point Likert scale ranging from "never" (1) to "often" (7). The construct validity of the GAS is found to be significantly high as both convergent and criterion validity has provided satisfactory correlations with other measures such as time spent on games. These validity tests demonstrate a strong construct validity of the GAS [12].

The fourth section explored impression management in MMORPG environments. Impression management is the process through which people try to control the impressions other people form of them. It is a goal directed conscious or unconscious attempt to influence the perceptions of other people about a person, object, or event by regulating and controlling information in social interaction [43]. An impression management scale for organisations developed by Bolino and Turnley [44] based on the Jones and Pittman Taxonomy [45] was adapted to fit the context of online gaming. Their taxonomy includes: *self promotion* (pointing out ones abilities or accomplishments in order to be seen as competent by observers)*, ingratiation* (use flattery or do favours to elicit an attribution of likability from observers)*, exemplification* (self sacrifice or go above and beyond the call of duty in order to gain the attribution of dedication from observers – (this subscale was omitted as it was considered irrelevant to MMORPG environments))*, intimidation* (signalling of power or potential to punish in order to be seen as dangerous by observers) *and supplication* (advertisement of weaknesses or shortcomings in order to elicit an attribution of being needy from observers). Participants were presented with a 7 point Likert scale ranging from "never" (1) to "often" (7).

The fifth section used an adapted Basic Psychological Needs Scale which is central to Deci and Ryan's Self Determination Theory (SDT) [46]. According to the theory, for an individual to develop and function in a healthy and optimal way the following fundamental needs must be continually satisfied: *autonomy,* (the condition of being autonomous; self-government, or the right of self-government; independence), *relatedness* (association or connection to others) *and competence* (possession of required skill, knowledge, qualification, or capacity; of sufficient quality). These 3 needs were measured using a total of 9 questions (3 – autonomy, 3 – relatedness, 3 – competence) adapted to fit the context of online gaming and the construct measured the extent to which online gaming fulfilled these needs. Respondents were provided with a 7 point Likert scale ranging from "not at all true" (1) to "very true" (7).

The final section focused on data disclosure in MMORPG environments together with the type of issues discussed between online gamers. Participants were presented with an array of personal data types and were required to select the details they had previously divulged (e.g. passwords, home address, financial data). In addition, participants were asked about their experiences of meeting online based friends in person.

4.3 Procedure

Following a small pilot study, recruitment invitations were sent to 80 Internet gaming cafes in Singapore and the questionnaire was also emailed to a range of students at a Singapore University. Both recruitment methods provided a hyperlink to the online questionnaire. The email address of the first author was given for any queries about the study. Participants were informed that participation was entirely voluntary and that the research was conducted according to the British Psychological Society's Ethical Code of Conduct for Psychologists. If participants no longer wished to take part, they simply had to close the Internet browser. All incomplete or duplicate answers were omitted from the data prior to analysis.

5. RESULTS

5.1 Basic demographics of gamers

Age. The average age of MMORPG players was 22.6 years ($SD = 2.21$ years).

Occupation. The sample comprised a large majority of students (95%). The rest of the participants were in a government employment/training scheme (2%), in paid full time work (1%), in paid part time work (1%) or were unemployed (1%).

Location of PC in the home. Most home gaming computers were situated in the bedroom (68%). Other locations included the hall (38%), study room (28%) and the spare room (8%).

Years of Internet usage. The majority of respondents (88%) had been using the Internet in the home for longer than 6 years. The remaining participants had been using the Internet between 5 and 6 years (8%), 3 and 4 years (3%) and 1 and 2 years (1%).

Online application usage. The most popular online applications used on a daily basis were email (92%), web browsing (92%) and online gaming (91%). Other applications included instant messaging (86%), downloading multimedia content (75%), social networking services (68%), online banking (21%), Voice over IP (21%) and shopping (18%).

5.2 MMORPG Experiences

Most played MMORPG's. The most played MMORPG's are shown in Table 1:

Title	Description	%
World of Warcraft (WoW)	Fantasy based multiplayer interactive role playing game with ~11 million paying subscribers in 2009. Developed by Blizzard, California and released in November 2004. Players can choose from a set of characters with differing skill sets and play in different virtual worlds known as realms. The game is set in the world of 'Azeroth' – a fantasy world consisting of monsters and dragons. Players use virtual currency for buying and selling of virtual goods. Experience points and levels are accumulated from successful missions and in game combat.	32%
Maple Story	Developed in 2003 by Wizet, South Korea with ~100 million user accounts in 2010. Free of charge 2D side scrolling role playing game focusing on venturing into dungeons and combating monsters in real-time. Experience points and virtual currency is obtained from successful missions.	14%
Cabal Online	First released in 2005 by ESTSoft, South Korea. Free of charge 3D online role playing game set in the world of 'Nevareth'. Centred on killing monsters by groups of players known as guilds. Experience points and virtual currency is awarded for successful missions.	6%
Granado Espada	First released in 2005 by IMC Games, South Korea. Subscription based fantasy game which takes place on a newly discovered continent based on the Americas during the Age of Exploration. Regions include forests, tropical jungles, plains, swamps, desserts and ice fields. Experience points and virtual currency are accumulated from successful combat. Players can control many characters simultaneously.	4%
Ragnarok Online	Developed and first released in 2002 by Gravity, South Korea. Subscription based multi player fantasy game which is based in a 2D world. Players develop their strength, agility, vitality, intelligence and luck through combat with other players. The setting is based on Korean comics and cartoons as well as being influenced by a wide variety of international cultures.	4%
Perfect World	Developed in 2005 by Perfect World Company, China. Heavily based on ancient Chinese mythology and set in the mythical world of 'Pangu'. Free to play game which relies on items sold in-game to make profits.	2%

Table 1: Most Played MMORPG's

62 other games were named and comprised the remaining 38% most-played MMORPG's.

Avatars. Just under one third of respondents (31%) used 5 or more avatars in the MMORPG they spent the most time playing. 40% used between 2 and 4 different avatars and just under a third (29%) only used 1 avatar. Only 13% of participants previously sold their avatar for real money and of these, 13% had regretted selling their character, highlighting the level of emotional attachment. In addition, 56% of participants had previously gender-swapped their avatar.

Time Investment. The mean average number of days per week spent playing MMORPG's was 4.69 (*SD = 2.17*). Moreover, the mean average number of hours per weekday was 4.42 (*SD = 5.43*) compared with 4.48 hours (*SD = 3.31*) per weekend day; highlighting that the majority of participants spent an equal number numbers of hours gaming during the week and at weekends.

Lifestyle Preference. Participants were asked if they had a lifestyle choice of living in a virtual world environment or in the real world environment as we exist today. Almost one third of participants (31%) stated they would prefer to live in a virtual environment as opposed to the remaining respondents (69%) who would prefer to live in a real world environment. Moreover, a chi-squared test (X^2) which compares the similarity of two distributions revealed that females showed no preference between the real (*n*=30) and virtual worlds (*n*=18), X^2 (1, *N* = 48) = 3.00, *p* = .083, (where *n* denotes the category size and *N* denotes the sample size). However, a greater number of males prefer the real world (*n*=100) over the virtual world (*n*=40), X^2 (1, *N* = 140) = 25.714, *p* = .001. These, and other test statistics reported in this paper also provide a measure of the probability that he results are due to chance (*p*). For a more comprehensive explanation of the procedures, see [49]

Addiction. Approximately three quarters (76%) of participants were classified as moderately addicted and one quarter (24%) as highly addicted to MMORPG's. The subscales (salience, tolerance, mood modification, conflict, relapse, withdrawal symptoms) of the addiction construct [12] were averaged for each participant (7 point Likert scale) answer set. Participants with an average addiction score >4 (median value of 7 point Likert scale) were classified as highly addicted and respondents with a score ≤4 were classified as moderately addicted. Similar results were found for self-perceived addiction with 80% of participants categorising themselves as moderately addicted and 20% categorising themselves as highly addicted. Regression analysis, which provides a measure of the usefulness of one or more variables in predicting another, found that participants who classified themselves as highly addicted typically obtained a high addiction score from the six point addiction construct (R(*N*=188) = .295 *p* < .001). In addition, males (M=3.4614, SD=.85390) typically exhibited higher levels of addiction to MMORPG's than females (M=3.0646, SD=1.00642). These differences were found to be statistically significant, *t*(186)=-2.446 *p= .015*), using an independent samples *t*-test (*t*) which compares the differences between the group means. There was however no significant difference in the number of hours spent playing MMORPG's between participants categorised as highly addicted (*t*(139)=-.810, *p*=.419) and those classified as moderately addicted (*t*(47)=.782, *p*=.438).

5.3 Player Behaviour in MMORPG's

Impression Management. Participants with a subscale score of >4 (median value of 7 point Likert scale) were categorised as exhibiting high levels of self-promotion, ingratiation, intimidation

or supplication and respondents with a score <=4 were categorised as exhibiting low levels of the aforementioned behaviours. The most common type of impression management behaviour exhibited within the MMORPG environment was ingratiation (high level 45%, low level 55%), illustrating that many players perceived their progression and development of in-game relationships was most effective when complimenting and praising fellow gamers. Self-promotion (high level 34%, low level 66%) was perceived to be the second most effective behaviour, whereby players talk about their experiences, achievements, accomplishments and talents in order to impress fellow gamers. Intimidation (high level 26%, low level 74%) was found to be less frequently adopted in online gaming, suggesting that players found aggression and awkward behaviour to be less of an effective tactic. In addition, supplication (high level 15%, low level 85%) was viewed as the least effective behaviour, suggesting players who constantly pretend to require assistance in an attempt to elicit help from fellow players find this to be relatively ineffective. There was no significant difference in the adoption of impression management techniques between male and female participants.

Basic Psychological Needs (SDT) of Online Gaming. Participants with a subscale score of >4 (median value of 7 point Likert scale) were categorised as experiencing high levels of autonomy, competence or relatedness and respondents with a score <=4 were categorised as experiencing low levels of the aforementioned behaviours. The results revealed that gamers' levels of autonomy (high level 83%, low level 17%) was the most satisfied basic psychological need. Relatedness (high level 52%, low level 48%) and competence (high level 52%, low level 48%) were satisfied to an equal degree. Participant subscale scores (autonomy, competence and relatedness) were averaged to give an overall measurement of needs satisfaction derived from MMORPG's. Respondents with an overall score of >4 (median value of 7 point Likert scale) were categorised as experiencing high levels of psychological needs satisfaction, where as respondents with a score of <=4 were categorised as experiencing low levels of psychological needs satisfaction. The majority of participants (69%) were found to be experiencing high levels of psychological needs satisfaction with approximately one third (31%) of participants experiencing low levels of satisfaction. There was however, no significant difference in basic psychological needs between genders.

5.4 Social Interaction in MMORPG's

Interaction with Fellow Gamers. The majority of participants (41%) mainly interact with online friends and some offline friends although an equal proportion of respondents (39%) interact mainly with offline friends and some online friends. Furthermore, 40% of respondents felt their relationship between their online and offline friends based friends were equally important to them.

Interaction Technologies. The most popular interaction technologies embraced by online gamers were instant messengers (80%), Facebook (44%), voice chat (37%) and SMS (32%). There was no significant difference in preference between genders save for that males (M=.419, SD=.495) preferred voice technologies to females (M=.111, SD=.319), (t(88.885)=-4.448, p<.001).

Issues Discussed. Issues discussed within MMORPG environments varied considerably, with 66% of respondent's frequently discussing game tactics, over one third (39%) often giving advice on personal issues and nearly a quarter (21%) frequently receiving advice on personal issues. Interestingly, over half of respondents (57%) rarely followed advice from fellow gamers on personal issues leaving 43% of respondents who occasionally followed advice on personal issues. The results also revealed a positive correlation between gamers that offered more advice on personal issues received more advice on personal issues (r (N=188) = .664 p < .001). Moreover, there was a positive correlation between gamers that received greater amounts of advice on personal issues tended to follow the advice given to them (r (N=188) = .541 p < .001).

Face-to-face Meetings. Just over two thirds (67%) of participants had previously met an online based gamer in person. Of these, 13% found the meeting to be completely different to what they had expected it to be whilst one third (33%) had no prior expectations. There was however no difference in expectations between genders.

5.5 Privacy Risk in MMORPG's

Data Disclosure. Each participant was given an overall disclosure score based on the number of data types they had previously disclosed within MMORPG environments. Participants with a disclosure score of >7 (median value) were categorised as high level disclosers and respondents with a score <=7 were categorised as low level disclosers. The study revealed high levels of data disclosure within MMORPG's environments with exactly 50% of respondents categorised as high level disclosers, however there was no statistical difference between genders or age groups.

There was a weak positive correlation between the hours of game play per week and levels of data disclosure (r (N=188) = .150 p < .040), illustrating that participants who engage in MMORPG environments for excessive periods of time could be more likely to disclose greater amounts of personal and sensitive data. Moreover, a significant positive correlation between levels of addiction to MMORPG's and levels of data disclosure was found (r (N=188) = .286 p < .001).

An analysis of variance (ANOVA) on disclosure across interaction between fellow gamers revealed that the more gamers interacted with online based friends the higher the levels of disclosure (F(3, 184) = 3.323 p = .021). Moreover, post hoc tests showed that gamers who interacted with only offline based friends disclosed significantly less than people who interacted with some or all online based friends (all p <.02).

Positive correlations emerged between the SDT subscales and levels of data disclosure. Indeed, analysis showed a positive correlation between relatedness and data disclosure (r (N=188) = .432 p < .001) and competence and data disclosure (r (N=188) = .294 p < .001). However no correlation was found between autonomy and data disclosure.

Positive correlations emerged between the impression management subscales and levels of data disclosure. Indeed, analysis showed a positive correlation between self-promotion and data disclosure (r (N=188) = .347 p < .001), ingratiation and data disclosure (r (N=188) = .285 p < .001) and intimidation and data disclosure (r (N=188) = .257 p < .001). However no correlation was found between supplication and data disclosure.

These findings support theories by Joinson [3] who found that the affordance of anonymity and hyper personal interaction

encourages participants to disclose greater amounts of personal and sensitive information within online interactive environments.

6. Discussion & Conclusion

The present study examined the effect of addiction on levels of data disclosure within Massively Multiplayer Online Role Playing Game environments together with an assessment of gamers' vulnerabilities to exploitation and predation. Results demonstrated significant relationships between pathological gaming and high levels of personal and sensitive data disclosure.

The fact that the majority of respondents were full time university students (95%) aged between 22 and 29 years would account for the equal number of hours spent gaming during the weekdays and weekends. It is commonly acknowledged that students have more flexible work schedules during the week than an individual in full time employment. Indeed, this would also influence the physical location of home gaming computers, with many students only occupying one private student bedroom.

The majority of participants were very familiar with online interactive environments with 99% having used the Internet in the home for 3 or more years. To this end, the popularity and rapid embrace of online applications such as instant messengers, MMORPG's and social networking services highlights the shift change in communication preference.

The results found the single most popular online game to be World of Warcraft (32%), however there was a large distribution of favourite MMORPG's with 38% of gamers playing games which did not require a financial subscription. This supports findings in current literature which highlight Yee's different motivations for online game playing [35] and suggests that the majority of respondents are motivated by factors such as achievement, immersion and manipulation as opposed to factors such as relationship and escapism.

Almost two thirds of participants used 2 or more avatars in the MMORPG they played the most and just over half (56%) had previously gender-swapped their character. This supports previous findings of Hussain and Griffiths [47] who found that 57% of respondents previously gender swapped their character for reasons including escapism, avoidance of inappropriate behaviour from gamers of the opposite sex and receiving free gifts and powers. The previous and present findings highlight some of the ulterior motives behind gamer-to-gamer communications and the potential for exploitation.

Consistent with current literature, a significant proportion of respondents (31%) stated they would prefer to exist in a virtual world environment in place of the real world in which we exist today. Furthermore, a small but significant number of participants demonstrated high levels of emotional attachment to their avatar and had regretted selling it for real money. Mehwash and Griffiths [48] point out that some university students may use online gaming as a coping mechanism when faced with temporary unpleasant emotional arousal stemming from high workloads (i.e. as a mood modifier).

Results revealed the most widely adopted impression management behaviour to be ingratiation and players found complementing and praising fellow gamers to be the most effective strategy for in

game progression. Furthermore, this complements theories from Joinson [3] and Walther [41] on the effects of hyper-personal interaction and reciprocity. In addition, the unique structural characteristics of MMORPG environments forces collaboration and dependence between players which could perhaps influence high levels of ingratiation as peer-to-peer co-operation is an integral element of online gaming [1]. Self-promotion of one's own skills and abilities was perceived to be an effective behaviour strategy for a significant number of participants and this is consistent with studies by Yee [15] and Griffiths [35] who assert that different player roles require different qualities and attributes (e.g. a guild leader is more likely to exhibit self-promotion to elicit confidence from other guild members). Intimidation and supplication were found to be less frequently exhibited behaviours and these approaches would be considered somewhat detrimental to the formation and continuation of in-game relationships.

More than two thirds of participants (69%) were found to be experiencing high levels of psychological stimulation from online gaming. Autonomy was the most satisfied subscale with relatedness and competence being satisfied to an equal degree. These findings illustrate the realism and immersiveness of modern virtual environments and provide a further justification for excessive engagement.

In-game interactions amongst participants were varied with the majority of gamers (41%) interacting mainly with online friends they know only in-game and some real life friends. Furthermore, 40% of participants felt their relationship between their online and offline friends were equally important to them, which further illustrates the level of emotional investment in online gaming. In many cases, these online based friendships are particularly salient and intense in nature [41] resulting in high levels of trust being placed in complete strangers. Types of issues discussed provided further evidence of trust formation within MMORPG environments with over one third (39%) often giving advice on personal issues and one fifth (21%) frequently receiving advice on personal issues unrelated to the game. Moreover, a significant proportion (43%) occasionally followed advice on personal issues and further analysis revealed a positive correlation between giving more advice and receiving more advice, highlighting high levels of reciprocity. Other findings from previous studies also suggest that levels of disclosure are higher in online interactive environments than in face-to-face contact due to perceived accountability [1].

Just under one quarter of participants (24%) were classified as highly addicted pathological gamers with three quarters exhibiting moderate levels of addiction (76%). These findings were supported by the levels of self-perceived addiction which found that one fifth of gamers perceived themselves as highly addicted. Consistent with previous findings [25], further analysis found that males typically exhibited higher levels of addiction than females suggesting that motivations for engagement could indeed influence levels of addiction [35]. Surprisingly, there was no difference in the number of hours spent playing MMORPG's between participants classified as highly addicted and those classified as moderately addicted.

The study revealed high levels of personal and sensitive data disclosure amongst MMORPG subscribers with exactly half (50%) of respondents classified as high level disclosers.

Furthermore, a positive correlation between the number of hours game play per week and levels of data disclosure illustrated that greater periods of playing time could induce a greater level of absorption and immersion in the game and lead to higher levels of self-disclosure. Moreover, a positive correlation between levels of addiction and levels of data disclosure further highlight the potential effect of behavioural addiction on levels of data disclosure. Whilst it is acknowledged that divulgation of certain data types (e.g. name and address) makes an individual more vulnerable to exploitation than others (e.g. gender and age), Mitnick [42] states that social engineers and online predators mine for all types of data in order to compile a comprehensive profile of their intended victim.

Further analysis found that relatedness and data disclosure were positively correlated and this is supported by previous psychological studies on human interaction [32], [39] who state that the stronger the association or connection an individual has with another, the greater the likelihood of self-disclosure. Unsurprisingly, no correlation between autonomy and data disclosure was found. Self-promotion, ingratiation and intimidation were all positively correlated with data disclosure. It is commonly acknowledged that self-promoting individuals are more likely to disclosure more about themselves in order to impress others around them, however, the correlations between ingratiation, intimidation and data disclosure are an area for future research.

Clearly, the present study has several methodological limitations. The survey included a somewhat modest number of gamers the majority of whom were university students. However, self-report surveys completed online are thought to increase honesty levels. The relatively low numbers of participants still produced highly significant results. The fact that all the participants were university students means that the sample was not representative of gamers, although demographic studies of gamers suggests that the gamers in this study were not that different from profiles reported elsewhere. The most likely reason for the relatively small number of participants was that the survey took a relatively long time to complete (approximately 30 minutes), and there was no incentive for doing so.

From online fraud to paedophilia, it is commonly acknowledged that computer mediated communication has provided a myriad of avenues for exploitation [1], [42]. Indeed, the affordances of anonymity combined with the immersive nature of MMORPG's creates an environment on which emotion, isolation and the desire for celebrity-like status takes precedence over individual safety and the protection of personal and sensitive data. The present study suggests that levels of addiction to MMORPG's are directly related to levels of self disclosure and gamer personalities influence the types of character roles adopted. Furthermore, the preceding evidence suggests that the structural characteristics of MMORPG's are more immersive than traditional online interactive environments [1] and encourage end-users to disclosure greater levels of personal and sensitive data. This places significant social responsibility on online gaming vendors to provide awareness raising information to subscribers on a) hours of game play b) risks of personal and sensitive data disclosure within MMORPG's and other digital ecosystems and c) formation of intimate relationships in MMORPG and other virtual environments. Online games are perceived as places of equality,

trust and utopia, however, this study suggests that these environments could indeed be used as potential avenues for future exploitation.

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Online Addiction: A Cultural Comparison of Privacy Risks in Online Gaming Environments

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ABSTRACT: *In this paper we investigated the levels of addiction and personal data disclosure within Massively Multiplayer Online Role Playing Game environments (MMORPG's). The study made use of an online survey, a combination of a six point behavioural addiction framework, Self Determination Theory and Impression Management theory to assess addictive behaviour and consequential data disclosure amongst a sample of 188 Singaporean based MMORPG gamers. These findings were juxtaposed with results of a previous study which investigated MMORPG addiction and data disclosure amongst 357 European online gamers to facilitate a cultural comparison [8]. Results found that pathological gaming addiction had a direct effect on levels of personal and sensitive data disclosure and participants who were disclosing high amounts of data were considered more vulnerable to exploitation and predation. In addition, the Singaporean sample exhibited similar levels of addiction yet marginally lower levels of data disclosure compared to their European counterparts.*

1. Introduction

Massively Multiplayer Online Role Playing Games (MMORPG's) are fully immersive three dimensional societies in which thousands of end users can interact and collaborate to accomplish complex tasks. MMORPG's have evolved from traditional single-player games and provide gamers with a highly social environment that facilitates and promotes hyper-personal communication. These virtual worlds have created extensive global communities in which end users can meet other gamers and build reputations based on their performance and ability to meet common goals [1]. Players can create one or more visual representations of themselves known as avatars. Avatars hold different sets of professions or roles that the MMORPG provides and the permanence and fluidity of roles varies depending on the design of the environment [2]. Each role has varying strengths and weaknesses and the structural characteristics of many MMORPG's forces players to trust and become dependent on their more experienced counterparts. MMORPG environments are infinite both in terms of size and ending. Goals and rewards typically use a random ratio reinforcement schedule based on operant conditioning [3], [4]. Hence, early achievements are quick, almost instantaneous; however as a player progresses in the game the amount of time, effort and level of complexity is increased until progression becomes almost imperceptible. In addition, the realism of MMORPG graphics continues to grow more sophisticated, contributing to the seductive, captivating appeal of the game and the likelihood of prolonged excessive engagement. This captivating appeal is otherwise described as 'stickiness' or 'flow' [5], [6]. The concept of cognitive 'flow' predicts an experience that completely engages an individual (e.g. MMORPG's) and creates the conditions conducive to maintain such a 'flow'. Moreover, such an immersive environment creates a highly pleasant and desired experience encouraging gamers to repeatedly engage in a particular game [7]. In addition to the seductive appeal of naturalistic graphical environments, MMORPG's are played in real time, requiring participants to remain online for excessive periods of time in order to keep up with the action. Indeed, this increase in time, effort and complexity encourages users to engage in such

environments for literally hours and days as they compete with themselves and other opponents to achieve higher ranks or beat previously attained scores [1], [2], [8]. Recent studies have highlighted the potential addictive aspects of MMORPG design infrastructures and press articles have revealed the impact of pathological Internet use [9], [10], [11].

2. Emergence and Measurement of Online Gaming Addiction

MMORPG addiction is currently one of the most discussed psychosocial aspects associated with playing computer and video games [12]. The emergence and acceptance of addiction to MMORPG's has grown significantly over the last decade [13], however, the conceptualisation of 'behavioural addiction' (i.e. one that does not involve the ingestion of a psychoactive drug) has long since been a matter of great debate. Any conceptualisation of addiction has implications for several groups of people (e.g. addicts, family members, researchers, practitioners and policy makers) and in some cases the needs of these groups may not be equally well served by certain models [14]. Griffiths [15] states that excessive activity and addictive activity are two very different levels of engagement and argues that the fundamental difference between excessive engagement and addiction is that the former enhances an individual's life as opposed to the latter which is destructive. Irrespective of the terminology used, researchers generally agree that computer and videogame overuse can lead to behavioural addiction [14]. Furthermore, addictive behaviour refers to behaviour that is excessive, compulsive, uncontrollable, and psychologically or physically destructive [16].

Online gaming addiction has been identified as a specific subtype of Internet addiction [17] and although Young [13] states it is difficult to estimate how widespread the problem is, the emergence of international online gaming addiction support centres illustrate the significance and acceptance of the problem [18], [19].

Many studies on gaming addiction are based on the diagnostic criteria for pathological gambling found in the Diagnostic and Statistical Manual of Mental Disorders (DSM). Researchers have developed various different scales to measure "pathological" gaming by adapting 6 or 7 of the DSM's criteria [20-30] (i.e. salience, tolerance, mood modification, withdrawal symptoms, relapse and conflict). Young's 8 item questionnaire [31] for diagnosing Internet addiction has often been adapted in studies specifically focusing on online gaming addiction [32-35], whilst other studies have adapted the ICD-10 diagnostic criteria for pathological gambling [36]. Several studies have devised their own set of criteria for gaming addiction [37-39].

The 6 point diagnostic (adapted) DSM criteria has been extensively embraced in many studies by Griffiths [11], [15], [23], [24] and is one of the few adapted frameworks that has been fully developed and validated as a game addiction scale. Moreover, Lemmens et al. [12] used factor analysis to confirm the validity of the second-order construct. According to Griffiths [11] an individual can be classified as behaviourally addicted if they satisfy each of the following 6 criteria:

1. **Salience:** Playing a game becomes the most important activity in a person's life and dominates his or her thinking (preoccupation), feelings (cravings), and behaviour (excessive use).

2. **Tolerance:** The process whereby someone starts playing games more often, thereby gradually building up the amount of time spent on games.

3. **Mood modification:** The subjective experiences that people report as a result of engagement in games. This dimension was previously labelled euphoria [11], [15], referring to a ''buzz'' or ''high'' that is derived from an activity. However, mood modification may also include tranquillizing and/or relaxing feelings related to escapism.

4. **Withdrawal Symptoms:** Unpleasant emotions and/or physical effects that occur when game play is suddenly reduced or discontinued. Withdrawal consists mostly of moodiness and irritability, but may also include physiological symptoms, such as shaking.

5. **Relapse:** The tendency to repeatedly revert to earlier patterns of game play. Excessive playing patterns are quickly restored after periods of abstinence or control.

6. **Conflict:** This refers to all interpersonal conflicts resulting from excessive gaming. Conflicts exist between the player and those around him/her. Conflicts may include arguments and neglect, but also lies and deception.

3. Privacy Risks in Online Gaming Environments

Online privacy and data protection are two of the most widely discussed aspects of computer mediated communication and evidence suggests that there is an increase in social and psychological dependencies to online communication services

(e.g. instant messengers, email, VoIP) [8]. Indeed, it is commonly acknowledged that the Internet has provided a platform for cheap, worldwide communication, offering support and interactive interaction amongst end-users [40].

Many studies have been conducted highlighting the identity and privacy risks associated with both synchronous and asynchronous computer mediated communication [1], however little attention has been given to privacy risks and data disclosure within MMORPG environments save for the social and lifestyle implications of pathological gaming.

Walther [41] describes peer-to-peer communication within MMORPG environments as hyper-personal and states that due to the nature of the communication channel, interactions are more intimate, more intense and more salient. Text based communication within such environments enable a sender to optimise their self-presentation which causes the receiver to form an inflated view of the sender due to the few optimised pieces of transmitted information. As a result of true visual anonymity and representation (e.g. body language) end-user perceptions of one another are purely based on the cues transmitted in text format [3]. Hyper-personal interaction invokes more personal and intimate communication between individuals which induces idealised impressions through reciprocity. As the levels of intensity and intimacy accumulate, so does the desire to spend increasing amounts of time online.

Yee [2] suggests there are factors unique to MMORPG environments that facilitate the formation of relationships. Indeed, collaboration and trust is required for achievement of many complex in-game goals and these scenarios initiate and nurture the building of relationships. In addition, the mythical and chivalric romance embraced in many MMORPG's (e.g. a 'knight in shining armour') further exacerbates the levels of hyper-personal interaction. Moreover, in-game collaboration, frequently involves peer-to-peer mentoring and exchanging of gifts (e.g. charms to advance to the next level).

Relationship development is a crucial factor in exploitation and predation [42] and the preceding evidence clearly illustrates that MMORPG environments encourage subscribers to form close, intimate and trusting relationships with fellow gamers, many of whom are in reality complete strangers. In addition, gamers often adopt gender-neutral pseudonyms for their characters, which enable the separation of real world and virtual identities but can also provide a greater level of anonymity for individuals with darker motives.

The purpose of our research was to explore a) levels of addiction to MMORPG's b) levels of personal and sensitive data disclosure within MMORPG environments and c) the resultant level of risk to MMORPG gamers. Our research also explored the correlation between addiction and data disclosure, which to date has not been investigated.

4. Method

4.1 Participants
The sample consisted of 188 self-selected native Singaporean MMOPRG players. All participants completed an online questionnaire in their own time. Of these participants, 74% were male ($n = 140$), 26% were female ($n = 48$). The mean age was 22.6 years ($SD = 2$ years). Of the participants who gave their current country of residence, 98% were currently living in Singapore ($n = 184$), 1% in Canada ($n = 2$) and 1% in the United States of America ($n = 2$). The high proportion of Singaporean respondents could have possibly created a cultural bias. Lack of motivation and integrity in online based surveys are two potential concerns, but studies have shown that web-based respondents are typically highly motivated because of self-selection. In addition, anonymity does not have an adverse effect on data integrity [2].

4.2 Design and materials
An online questionnaire survey was designed using a browser based data collection program (Lime Survey) and was divided into 6 sections. The first section asked for information about gender, age, country of origin and current residence, level of education and number of years using the Internet in the home. The second section asked respondents where in the home their computers were typically situated and what Internet based functions were used on a daily basis.

The third section focused on addiction asking participants about their playing habits, time spent online during weekdays and weekends and the number of different avatars used in the current MMORPG game that they currently spent the most time engaging in. In addition, a 22 item Game Addiction Scale (GAS) developed by Lemmens et. al. [12] in accordance with Griffith's 6 point behavioural addiction framework [11] (salience, tolerance, mood modification, conflict, relapse, withdrawal symptoms) was used and participants were provided with a 7 point Likert scale ranging from "never" (1) to "often" (7). The construct validity of the GAS is found to be significantly high as both convergent and criterion validity has provided satisfactory correlations with other measures such as time spent on games. These validity tests demonstrate a strong construct validity of the GAS [12].

The fourth section explored impression management in MMORPG environments. Impression management is the process through which people try to control the impressions other people form of them. It is a goal directed conscious or unconscious attempt to influence the perceptions of other people about a person, object, or event by regulating and controlling information in social interaction [43]. An impression management scale for organisations developed by Bolino and Turnley [44] based on the Jones and Pittman Taxonomy [45] was adapted to fit the context of online gaming. Their taxonomy includes: *self promotion* (pointing out ones abilities or accomplishments in order to be seen as competent by observers), *ingratiation* (use flattery or do favours to elicit an attribution of likability from observers), *exemplification* (self sacrifice or go above and beyond the call of duty in order to gain the attribution of dedication from observers – (this subscale was omitted as it was considered irrelevant to MMORPG environments)), *intimidation* (signalling of power or potential to punish in order to be seen as dangerous by observers) *and supplication* (advertisement of weaknesses or shortcomings in order to elicit an attribution of being needy from observers). Participants were presented with a 7 point Likert scale ranging from "never" (1) to "often" (7).

The fifth section used an adapted Basic Psychological Needs Scale which is central to Deci and Ryan's Self Determination Theory (SDT) [46]. According to the theory, for an individual to develop and function in a healthy and optimal way the following fundamental needs must be continually satisfied: *autonomy,* (the condition of being autonomous; self-government, or the right of self-government; independence), *relatedness* (association or connection to others) *and competence* (possession of required skill, knowledge, qualification, or capacity; of sufficient quality). These 3 needs were measured using a total of 9 questions (3 – autonomy, 3 – relatedness, 3 – competence) adapted to fit the context of online gaming and the construct measured the extent to which online gaming fulfilled these needs. Respondents were provided with a 7 point Likert scale ranging from "not at all true" (1) to "very true" (7).

The final section focused on data disclosure in MMORPG environments together with the type of issues discussed between online gamers. Participants were presented with an array of personal data types and were required to select the details they had previously divulged (e.g. passwords, home address, financial data). In addition, participants were asked about their experiences of meeting online based friends in person.

4.3 Procedure
Following a small pilot study, recruitment invitations were sent to 80 Internet gaming cafes in Singapore and the questionnaire was also emailed to a range of students at a Singapore University. Both recruitment methods provided a hyperlink to the online questionnaire. The email address of the first author was given for any queries about the study. Participants were informed that participation was entirely voluntary and that the research was conducted according to the British Psychological Society's Ethical Code of Conduct for Psychologists. If participants no longer wished to take part, they simply had to close the Internet browser. All incomplete or duplicate answers were omitted from the data prior to analysis.

5. Results

5.1 Basic demographics of gamers
Age. The average age of MMORPG players was 22.6 years (*SD = 2.21 years*).

Occupation. The sample comprised a large majority of students (95%). The rest of the participants were in a government employment/training scheme (2%), in paid full time work (1%), in paid part time work (1%) or were unemployed (1%).

Location of PC in the home. Most home gaming computers were situated in the bedroom (68%). Other locations included the hall (38%), study room (28%) and the spare room (8%).

Years of Internet usage. The majority of respondents (88%) had been using the Internet in the home for longer than 6 years. The remaining participants had been using the Internet between 5 and 6 years (8%), 3 and 4 years (3%) and 1 and 2 years (1%).

Online application usage. The most popular online applications used on a daily basis were email (92%), web browsing (92%) and online gaming (91%). Other applications included instant messaging (86%), downloading multimedia content (75%), social networking services (68%), online banking (21%), Voice over IP (21%) and shopping (18%).

5.2 MMORPG Experiences

Most played MMORPG's. The most played MMORPG's are shown in Table 1:

Title	Description	%
World of Warcraft (WoW)	Fantasy based multiplayer interactive role playing game with ~11 million paying subscribers in 2009. Developed by Blizzard, California and released in November 2004. Players can choose from a set of characters with differing skill sets and play in different virtual worlds known as realms. The game is set in the world of 'Azeroth' – a fantasy world consisting of monsters and dragons. Players use virtual currency for buying and selling of virtual goods. Experience points and levels are accumulated from successful missions and in game combat.	32%
Maple Story	Developed in 2003 by Wizet, South Korea with ~100 million user accounts in 2010. Free of charge 2D side scrolling role playing game focusing on venturing into dungeons and combating monsters in real-time. Experience points and virtual currency is obtained from successful missions.	14%
Cabal Online	First released in 2005 by ESTSoft, South Korea. Free of charge 3D online role playing game set in the world of 'Nevareth'. Centred on killing monsters by groups of players known as guilds. Experience points and virtual currency is awarded for successful missions.	6%
Granado Espada	First released in 2005 by IMC Games, South Korea. Subscription based fantasy game which takes place on a newly discovered continent based on the Americas during the Age of Exploration. Regions include forests, tropical jungles, plains, swamps, desserts and ice fields. Experience points and virtual currency are accumulated from successful combat. Players can control many characters simultaneously.	4%
Ragnarok Online	Developed and first released in 2002 by Gravity, South Korea. Subscription based multi player fantasy game which is based in a 2D world. Players develop their strength, agility, vitality, intelligence and luck through combat with other players. The setting is based on Korean comics and cartoons as well as being influenced by a wide variety of international cultures.	4%
Perfect World	Developed in 2005 by Perfect World Company, China. Heavily based on ancient Chinese mythology and set in the mythical world of 'Pangu'. Free to play game which relies on items sold in-game to make profits.	2%

Table 1. Most Played MMORPG's

62 other games were named and comprised the remaining 38% most-played MMORPG's.

Avatars. Just under one third of respondents (31%) used 5 or more avatars in the MMORPG they spent the most time playing. 40% used between 2 and 4 different avatars and just under a third (29%) only used 1 avatar. Only 13% of participants previously sold their avatar for real money and of these, 13% had regretted selling their character, highlighting the level of emotional attachment. In addition, 56% of participants had previously gender-swapped their avatar.

Time Investment. The mean average number of days per week spent playing MMORPG's was 4.69 (*SD = 2.17).* Moreover, the mean average number of hours per weekday was 4.42 (*SD = 5.43)* compared with 4.48 hours (*SD = 3.31)* per weekend day; highlighting that the majority of participants spent an equal number numbers of hours gaming during the week and at weekends.

Lifestyle Preference. Participants were asked if they had a lifestyle choice of living in a virtual world environment or in the real world environment as we exist today. Almost one third of participants (31%) stated they would prefer to live in a virtual environment as opposed to the remaining respondents (69%) who would prefer to live in a real world environment. Moreover, a chi-squared test (X^2) which compares the similarity of two distributions revealed that females showed no preference between the real (n=30) and virtual worlds (n=18), X^2 (1, N = 48) = 3.00, p = .083, (where n denotes the category size and N denotes the sample size). However, a greater number of males prefer the real world (n=100) over the virtual world (n=40), X^2 (1, N = 140) = 25.714, p = .001. These, and other test statistics reported in this paper also provide a measure of the probability that he results are due to chance (p). For a more comprehensive explanation of the procedures, see [49]

Addiction. Approximately three quarters (76%) of participants were classified as moderately addicted and one quarter (24%) as highly addicted to MMORPG's. The subscales (salience, tolerance, mood modification, conflict, relapse, withdrawal symptoms) of the addiction construct [12] were averaged for each participant (7 point Likert scale) answer set. Participants

with an average addiction score > 4 (median value of 7 point Likert scale) were classified as highly addicted and respondents with a score ≤ 4 were classified as moderately addicted. Similar results were found for self-perceived addiction with 80% of participants categorising themselves as moderately addicted and 20% categorising themselves as highly addicted. Regression analysis found that participants who classified themselves as highly addicted typically obtained a high addiction score from the six point addiction construct (R($N = 188$) = .295 $p < .001$). In addition, males (M = 3.4614, SD =.85390) typically exhibited higher levels of addiction to MMORPG's than females (M = 3.0646, SD = 1.00642), (t(186) = -2.446 $p = .015$). There was however no significant difference in the number of hours spent playing MMORPG's between participants categorised as highly addicted (t(139) = -.810, $p = .419$) and those classified as moderately addicted (t(47) =.782, $p =.438$).

5.3 Player Behaviour in MMORPG's

Impression Management. Participants with a subscale score of >4 (median value of 7 point Likert scale) were categorised as exhibiting high levels of self-promotion, ingratiation, intimidation or supplication and respondents with a score <=4 were categorised as exhibiting low levels of the aforementioned behaviours. The most common type of impression management behaviour exhibited within the MMORPG environment was ingratiation (high level 45%, low level 55%), illustrating that many players perceived their progression and development of in-game relationships was most effective when complimenting and praising fellow gamers. Self-promotion (high level 34%, low level 66%) was perceived to be the second most effective behaviour, whereby players talk about their experiences, achievements, accomplishments and talents in order to impress fellow gamers. Intimidation (high level 26%, low level 74%) was found to be less frequently adopted in online gaming, suggesting that players found aggression and awkward behaviour to be less of an effective tactic. In addition, supplication (high level 15%, low level 85%) was viewed as the least effective behaviour, suggesting players who constantly pretend to require assistance in an attempt to elicit help from fellow players find this to be relatively ineffective. There was no significant difference in the adoption of impression management techniques between male and female participants.

Basic Psychological Needs (SDT) of Online Gaming. Participants with a subscale score of > 4 (median value of 7 point Likert scale) were categorised as experiencing high levels of autonomy, competence or relatedness and respondents with a score <= 4 were categorised as experiencing low levels of the aforementioned behaviours. The results revealed that gamers' levels of autonomy (high level 83%, low level 17%) was the most satisfied basic psychological need. Relatedness (high level 52%, low level 48%) and competence (high level 52%, low level 48%) were satisfied to an equal degree. Participant subscale scores (autonomy, competence and relatedness) were averaged to give an overall measurement of needs satisfaction derived from MMORPG's. Respondents with an overall score of > 4 (median value of 7 point Likert scale) were categorised as experiencing high levels of psychological needs satisfaction, where as respondents with a score of <=4 were categorised as experiencing low levels of psychological needs satisfaction. The majority of participants (69%) were found to be experiencing high levels of psychological needs satisfaction with approximately one third (31%) of participants experiencing low levels of satisfaction. There was however, no significant difference in basic psychological needs between genders.

5.4 Social Interaction in MMORPG's

Interaction with Fellow Gamers. The majority of participants (41%) mainly interact with online friends and some offline friends although an equal proportion of respondents (39%) interact mainly with offline friends and some online friends. Furthermore, 40% of respondents felt their relationship between their online and offline friends based friends were equally important to them.

Interaction Technologies. The most popular interaction technologies embraced by online gamers were instant messengers (80%), Facebook (44%), voice chat (37%) and SMS (32%). There was no significant difference in preference between genders save for that males (M =.419, SD =.495) preferred voice technologies to females (M =.111, SD =.319), (t(88.885) = -4.448, $p < .001$).

Issues Discussed. Issues discussed within MMORPG environments varied considerably, with 66% of respondent's frequently discussing game tactics, over one third (39%) often giving advice on personal issues and nearly a quarter (21%) frequently receiving advice on personal issues. Interestingly, over half of respondents (57%) rarely followed advice from fellow gamers on personal issues leaving 43% of respondents who occasionally followed advice on personal issues. The results also revealed a positive correlation between gamers that offered more advice on personal issues received more advice on personal issues (r (N =188) = .664 $p < .001$). Moreover, there was a positive correlation between gamers that received greater amounts of advice on personal issues tended to follow the advice given to them (r (N =188) = .541 $p < .001$).

Face-to-face Meetings. Just over two thirds (67%) of participants had previously met an online based gamer in person. Of these, 13% found the meeting to be completely different to what they had expected it to be whilst one third (33%) had no prior expectations. There was however no difference in expectations between genders.

5.5 Privacy Risk in MMORPG's

Data Disclosure. Each participant was given an overall disclosure score based on the number of data types they had previously disclosed within MMORPG environments. Participants with a disclosure score of >7 (median value) were categorised as high level disclosers and respondents with a score <=7 were categorised as low level disclosers. The study revealed high levels of data disclosure within MMORPG's environments with exactly 50% of respondents categorised as high level disclosers, however there was no statistical difference between genders or age groups.

There was a weak positive correlation between the hours of game play per week and levels of data disclosure (r (N=188) = .150 p < .040), illustrating that participants who engage in MMORPG environments for excessive periods of time could be more likely to disclose greater amounts of personal and sensitive data. Moreover, a significant positive correlation between levels of addiction to MMORPG's and levels of data disclosure was found (r (N =188) = .286 p < .001).

An analysis of variance (ANOVA) on disclosure across interaction between fellow gamers revealed that the more gamers interacted with online based friends the higher the levels of disclosure (F(3, 184) = 3.323 p = .021). Moreover, post hoc tests showed that gamers who interacted with only offline based friends disclosed significantly less than people who interacted with some or all online based friends (all p <.02).

Positive correlations emerged between the SDT subscales and levels of data disclosure. Indeed, analysis showed a positive correlation between relatedness and data disclosure (r (N=188) = .432 p < .001) and competence and data disclosure (r (N =188) = .294 p < .001). However no correlation was found between autonomy and data disclosure.

Positive correlations emerged between the impression management subscales and levels of data disclosure. Indeed, analysis showed a positive correlation between self-promotion and data disclosure (r (N =188) = .347 p < .001), ingratiation and data disclosure (r (N =188) = .285 p < .001) and intimidation and data disclosure (r (N =188) = .257 p < .001). However no correlation was found between supplication and data disclosure.

These findings support theories by Joinson [3] who found that the affordance of anonymity and hyper personal interaction encourages participants to disclose greater amounts of personal and sensitive information within online interactive environments.

5.6 Cultural Similarities and Differences

Given the global emergence of and subscription to MMORPG's, the results of the Singaporean sample were analysed against a previous dataset comprising of 357 European gamers [8] in order to reveal any cultural similarities and differences between European and Asian online gamers.

The average age of the European sample (*M* = 25.7 years, *SD = 4.32*) was marginally lower than the Asian sample (*M*=22.6 years, *SD = 2.21 years*), and there was a greater male dominance (86%) in the European demographic.

The Singaporean dataset comprised a greater proportion of students (95%), whereas the European sample comprised a more even spread of full time employees (35%) and students (48%).

Time investment varied between samples. On average, European gamers spent 5.37 *(SD =1.81)* days per week playing MMORPG's compared with their Singaporean counterparts who spent 4.69 (*SD* = 2.17) days per week gaming. Singaporean gamers appeared to spend more hours playing per weekday (M = 4.42, *SD* = 5.43) than their European counterparts (*M* = 4.37, *SD* = 1.64), however, European gamers invested more time in their game at weekends (*M* = 5.72, *SD* = 1.25) than did Singaporeans (*M* = 4.48, *SD* = 3.31).

The most played MMORPG in both samples was World of Warcraft, however a greater number of European gamers played WoW (67%) compared with Singaporean gamers (32%). Furthermore, aside from World of Warcraft, European gamers preferred subscription based games such as StarWars Galaxies (4%), Starcraft (3%) and Lord of the Rings (3%) whereas the majority of games (except World of Warcraft) played by the Singaporean sample (table 1) were subscription free.

Significantly more European gamers stated they would prefer to live in the online gaming world (53%) as opposed to the real world (47%) compared with Singaporean gamers (online gaming world, 31%, real world, 69%).

There was little variance in classified levels of addiction between samples with 77% of European gamers and 76% of Singaporean gamers classified as moderately addicted juxtaposed with 23% of European gamers and 24% of Singaporean gamers classified as highly addicted. Greater variance was observed in participants self perceived addiction with 76% of European gamers and 80% of Singaporean gamers reported moderate levels of online gaming addiction, as opposed to 25% of European gamers and 20% of Singaporean gamers who perceived themselves as highly addicted. In contrast to the gender differences

in levels of addiction observed in 5.2 (Addiction), no statistically significant differences between genders and levels of addition were found in the European dataset. Furthermore a t-test on overall variance in average levels of addiction between sample sets found no statistically significant difference.

Marginal variance was found between sample sets in relation to interaction with fellow gamers. Indeed, 40% of European gamers and 41% of Singaporean gamers interact mainly with online friends and some offline friends, as opposed to 44% European gamers and 39% of Singaporean gamers interact mainly with offline friends and some online friends. The remaining 16% (European) and 20% (Singaporean) interacted only with friends who they knew offline in person. In addition, a greater variance was found between the European (31%) and Singaporean (40%) respondents who felt their relationship between their online and offline based friends were equally important to them.

Comparative analysis found a significant variance between sample sets with regards to issues discussed in game between players with 4% of European gamers versus 66% of Singaporean gamers only discussing game tactics and 96% of European gamers versus 34% discussing personal issues not related to the game.

Significantly more Singaporean gamers (67%) had previously met another gamer in person compared with European gamers (38%), however, in contrast, 20% of European gamers found the experience completely different to what they had expected it to be compared to 13% of Singaporean gamers.

Marginal variance was found between levels of data disclosure with 56% of European participants and 50% of Singaporean participants classified as high level disclosers.

In contrast to the positive correlation between the hours of game play per week and levels of data disclosure (5.5) found in the Singaporean dataset, no statistically significant difference was found in the European dataset. Interestingly, however, the European dataset yielded a much stronger positive correlation (r (N =357) = .985 p < .001) between addiction and data disclosure than the Singaporean dataset (r (N =188) = .150 p < .040). T-test analysis conducted on both datasets revealed no statistically significant differences in disclosure levels between age groups or disclosure levels between cultures. There was however differences on average disclosure levels between cultures with Singaporean gamers (*M =.612, SD =1.465)* disclosing comparatively more than their European counterparts (*M =.000, SD =1.000)* (*t*(543) = -5.757, *p*<.001).

6. Discussion and Conclusion

The present study examined the effect of addiction on levels of data disclosure within Massively Multiplayer Online Role Playing Game environments together with an assessment of gamers' vulnerabilities to exploitation and predation. Results demonstrated significant relationships between pathological gaming and high levels of personal and sensitive data disclosure.

The fact that the majority of respondents were full time university students (95%) aged between 22 and 29 years would account for the equal number of hours spent gaming during the weekdays and weekends. It is commonly acknowledged that students have more flexible work schedules during the week than an individual in full time employment. Indeed, this would also influence the physical location of home gaming computers, with many students only occupying one private student bedroom.

The majority of participants were very familiar with online interactive environments with 99% having used the Internet in the home for 3 or more years. To this end, the popularity and rapid embrace of online applications such as instant messengers, MMORPG's and social networking services highlights the shift change in communication preference.

The results found the single most popular online game to be World of Warcraft (32%), however there was a large distribution of favourite MMORPG's with 38% of gamers playing games which did not require a financial subscription. This supports findings in current literature which highlight Yee's different motivations for online game playing [35] and suggests that the majority of respondents are motivated by factors such as achievement, immersion and manipulation as opposed to factors such as relationship and escapism.

Almost two thirds of participants used 2 or more avatars in the MMORPG they played the most and just over half (56%) had previously gender-swapped their character. This supports previous findings of Hussain and Griffiths [47] who found that 57% of respondents previously gender swapped their character for reasons including escapism, avoidance of inappropriate behaviour from gamers of the opposite sex and receiving free gifts and powers. The previous and present findings highlight some of the ulterior motives behind gamer-to-gamer communications and the potential for exploitation.

Consistent with current literature, a significant proportion of respondents (31%) stated they would prefer to exist in a virtual world environment in place of the real world in which we exist today. Furthermore, a small but significant number of participants demonstrated high levels of emotional attachment to their avatar and had regretted selling it for real money. Mehwash

and Griffiths [48] point out that some university students may use online gaming as a coping mechanism when faced with temporary unpleasant emotional arousal stemming from high workloads (i.e. as a mood modifier).

Results revealed the most widely adopted impression management behaviour to be ingratiation and players found complementing and praising fellow gamers to be the most effective strategy for in game progression. Furthermore, this complements theories from Joinson [3] and Walther [41] on the effects of hyper-personal interaction and reciprocity. In addition, the unique structural characteristics of MMORPG environments forces collaboration and dependence between players which could perhaps influence high levels of ingratiation as peer-to-peer co-operation is an integral element of online gaming [1]. Self-promotion of one's own skills and abilities was perceived to be an effective behaviour strategy for a significant number of participants and this is consistent with studies by Yee [15] and Griffiths [35] who assert that different player roles require different qualities and attributes (e.g. a guild leader is more likely to exhibit self-promotion to elicit confidence from other guild members). Intimidation and supplication were found to be less frequently exhibited behaviours and these approaches would be considered somewhat detrimental to the formation and continuation of in-game relationships.

More than two thirds of participants (69%) were found to be experiencing high levels of psychological stimulation from online gaming. Autonomy was the most satisfied subscale with relatedness and competence being satisfied to an equal degree. These findings illustrate the realism and immersiveness of modern virtual environments and provide a further justification for excessive engagement.

In-game interactions amongst participants were varied with the majority of gamers (41%) interacting mainly with online friends they know only in-game and some real life friends. Furthermore, 40% of participants felt their relationship between their online and offline friends were equally important to them, which further illustrates the level of emotional investment in online gaming. In many cases, these online based friendships are particularly salient and intense in nature [41] resulting in high levels of trust being placed in complete strangers. Types of issues discussed provided further evidence of trust formation within MMORPG environments with over one third (39%) often giving advice on personal issues and one fifth (21%) frequently receiving advice on personal issues unrelated to the game. Moreover, a significant proportion (43%) occasionally followed advice on personal issues and further analysis revealed a positive correlation between giving more advice and receiving more advice, highlighting high levels of reciprocity. Other findings from previous studies also suggest that levels of disclosure are higher in online interactive environments than in face-to-face contact due to perceived accountability [1].

Just under one quarter of participants (24%) were classified as highly addicted pathological gamers with three quarters exhibiting moderate levels of addiction (76%). These findings were supported by the levels of self-perceived addiction which found that one fifth of gamers perceived themselves as highly addicted. Consistent with previous findings [25], further analysis found that males typically exhibited higher levels of addiction than females suggesting that motivations for engagement could indeed influence levels of addiction [35]. Surprisingly, there was no difference in the number of hours spent playing MMORPG's between participants classified as highly addicted and those classified as moderately addicted.

The study revealed high levels of personal and sensitive data disclosure amongst MMORPG subscribers with exactly half (50%) of respondents classified as high level disclosers. Furthermore, a positive correlation between the number of hours game play per week and levels of data disclosure illustrated that greater periods of playing time could induce a greater level of absorption and immersion in the game and lead to higher levels of self-disclosure. Moreover, a positive correlation between levels of addiction and levels of data disclosure further highlight the potential effect of behavioural addiction on levels of data disclosure. Further analysis found that relatedness and data disclosure were positively correlated and this is supported by previous psychological studies on human interaction [32], [39] who state that the stronger the association or connection an individual has with another, the greater the likelihood of self-disclosure. Unsurprisingly, no correlation between autonomy and data disclosure was found. Self-promotion, ingratiation and intimidation were all positively correlated with data disclosure. It is commonly acknowledged that self-promoting individuals are more likely to disclosure more about themselves in order to impress others around them, however, the correlations between ingratiation, intimidation and data disclosure are an area for future research.

Cultural analysis between the Singaporean and European datasets highlighted several similarities and differences. Firstly the Singaporean dataset comprised a far greater proportion of students which is reflected in the number of hours spent playing their MMORPG per weekday. Indeed it is commonly acknowledged that the student lifestyle has greater flexibility on working hours in contrast to individuals in full time or part time employment. However, on average Singaporean gamers spent less time overall playing online games in comparison to their European counterparts.

World of Warcraft was the most played MMORPG in both datasets, however significantly more European gamers played

the game compared to the Singaporean sample. To this end the majority of Singaporean participants who played alternative MMORPG's chose subscription free games, which is possibly due to student budget constraints.

Comparative analysis on lifestyle preferences indicated that European gamers are more motivated by the immersion factor [35] of MMORPG's than their Singaporean counterparts with over half of European respondents stating they would prefer to live in an online gaming environment.

Both datasets revealed very similar levels of classified addiction but a slight variance in self perceived addiction with ~5% of participants in both datasets believing themselves to be pathological gamers but not classified as addicted by the afore-mentioned addiction scales.

Surprisingly, a greater proportion of Singaporean gamers felt their relationship between their online and offline friends were equally important to them in comparison to their European counterparts. This finding is inconsistent with the indications from the comparative analysis on lifestyle preferences. Indeed, it would be reasonable to hypothesise that gamers who would prefer to live in an online gaming environment would consider their online relationships between online and offline friends to be equally important. However, the conflicting results do not support such a hypothesis.

The most significant variation was highlighted in participants responses to issues discussed in game. Significantly more European gamers discussed personal issues not related to the game compared to Singaporean issues. This is a positive indication of a cultural influence in that Asian individuals are more introvert than their western counterparts [49]. In contrast, a significantly higher number of Singaporean gamers had previously met an online based friend in person compared with European gamers. Gluck [50] asserts that highly skilled online gamers adopt a celebrity like status amongst peers and specialist online gaming cafés provide intensive training for individuals to become experts in playing MMORPG's. Given the popularity and desire for celebrity like status amongst the Asian culture, juxtaposed with the perceived ambient safety of Singapore as a country [51], it is not surprising that more gamers are willing to meet online based friends in person.

Variances in levels of data disclosure differed between datasets with Singaporean gamers, on average, disclosing comparatively more personal and sensitive data in game than their European counterparts. Whilst there was only a variance of 6% between Singaporean (50%) and European (56%) levels of data disclosure, the European dataset revealed a much stronger correlation between addiction and data disclosure compared with the Singaporean sample, highlighting both a greater level of immersion and addiction related disclosure amongst European gamers.

Comparative analysis between datasets provided little evidence to support any cultural influences on gaming addiction and consequential data disclosure. It is therefore concluded that in the case of the aforementioned studies, participant's culture and background had a minimal effect on in game behaviour.

Clearly, the present study has several methodological limitations. The survey included a somewhat modest number of gamers the majority of whom were university students. However, self-report surveys completed online are thought to increase honesty levels. The relatively low numbers of participants still produced highly significant results. The fact that all the participants were university students means that the sample was not representative of gamers, although demographic studies of gamers suggests that the gamers in this study were not that different from profiles reported elsewhere. The most likely reason for the relatively small number of participants was that the survey took a relatively long time to complete (approximately 30 minutes), and there was no incentive for doing so. To this end, it is important to recognise the possible sample biases when conducting a cultural comparative analysis.

From online fraud to paedophilia, it is commonly acknowledged that computer mediated communication has provided a myriad of avenues for exploitation [1], [42]. Indeed, the affordances of anonymity combined with the immersive nature of MMORPG's creates an environment on which emotion, isolation and the desire for celebrity-like status takes precedence over individual safety and the protection of personal and sensitive data. The present study suggests that levels of addiction to MMORPG's are directly related to levels of self disclosure and gamer personalities influence the types of character roles adopted. Furthermore, the preceding evidence suggests that the structural characteristics of MMORPG's are more immersive than traditional online interactive environments [1] and encourage end-users to disclosure greater levels of personal and sensitive data. This places significant social responsibility on online gaming vendors to provide awareness raising information to subscribers on a) hours of game play b) risks of personal and sensitive data disclosure within MMORPG's and c) formation of intimate relationships in MMORPG environments. Online games are perceived as places of equality, trust and utopia, however, this study suggests that these environments could indeed be used as potential avenues for future exploitation.

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EMERGING OPPORTUNITIES AND RISKS IN MASSIVELY MULTIPLAYER ONLINE ROLE PLAYING GAMES

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ABSTRACT

Massively Multiplayer Online Role Playing Games (MMORPG's) are highly immersive environments which promote and sustain hyper personal interaction amongst players. This body of work aimed to identify, compare and draw conclusions from existing and ongoing research on player behaviour, motivations, addiction, data disclosure and the potential for harm in MMORPGs. Two quantitative survey based studies and a series of semi structured interviews formed the evidence base for the research findings. The first quantitative study consisted of European participants (n=357) and the second of Singaporean participants (n=188). In addition the European study encompassed qualitative findings from semi structured interviews.

Player behaviour was measured using Bolino and Turnley's (2003) Impression Management (IM) Scale adapted to fit the context of online gaming. An adapted Basic Psychological Needs scale from Deci and Ryan's (2000) Self Determination Theory (SDT) was used to measure the degree to which online gaming fulfils the basic psychological needs of the participant gamer. Addiction was measured using the Game Addiction Scale (GAS) developed by Lemmens et. al. (2009) and data disclosure was measured and scored based on the number of data types previously disclosed within MMORPG environments. Participants exhibited varying levels of addiction and over half were found to be high level disclosers of personal and sensitive data, making them potentially more vulnerable to exploitation and predation. Hours of game play was found to

influence data disclosure indicating that participants who engage in MMORPG environments for excessive periods of time could be more likely to disclose greater amounts of personal and sensitive data. Significant correlations were found between addiction and data disclosure highlighting that players who exhibit higher levels of addiction to MMORPGs typically disclose greater amounts of data. Players perceived their progression and development of in-game relationships was most effective when complimenting and praising fellow gamers. Self promotion was found to be the second most effective behaviour whereby players talk about their experiences, achievements, accomplishments and talents in order to impress fellow gamers. Intimidation and supplication were found to be the least effective impression management behaviours.

Many participants exhibited a susceptibility to harm as 67% had previously met an online based gaming acquaintance in person. Other gamers reported falling foul to one or more social engineering attacks including: stealing of account credentials and character abilities, fraud and transmission of sexually oriented pictures. The evidence base found that a) addiction to online games increases levels of data disclosure b) the unique structural characteristics of MMORPGs adds new dimensions to social interactions introducing emerging risks and vulnerabilities (including increased levels of trust, inter-player dependency and consequential privacy risks through data disclosure), c) self-promotion was found to strengthen inter-player relationships and d) engagement in online games in many cases fulfils players basic psychological needs of autonomy, competence and relatedness.

KEYWORDS: Online gaming, addiction, data disclosure, privacy, risk

Introduction

Massively Multiplayer Online Role Playing Game's (MMORPG) are unique, fully immersive environments housing populations of characters with their own varying experiences, assets and values (Öqvist, 2009). MMORPGs are highly social arenas consisting of platforms where players can chat and interact with one another whilst participating in a fantasy world with like minded individuals (Chen et. al. 2008). These environments have evolved from traditional single-player games to global communities in which end users can meet other gamers and build reputations based on their performance and ability to meet common goals (Yee, 2006).

Structural characteristics of MMORPGs differentiate these environments from other online interactive platforms (e.g. instant messengers and email). Players can create one or more visual representations of themselves known as avatars which enable them to experiment with and explore different identities (e.g. gender and class). Avatars hold different sets of professions or roles that the MMORPG provides and the permanence and fluidity of roles varies depending on the design of the environment (Yee, 2006). Each role has varying strengths and weaknesses and the structural characteristics of many MMORPGs forces players to trust and become dependent on their more experienced counterparts.

MMORPG environments are infinite both in terms of size and ending. Based on Skinner's (1974) theory of behaviourism, goals and rewards typically use a random ratio reinforcement schedule based on operant conditioning (Yee, 2006; Yee, 2004). Hence, in the context of MMORPGs, early achievements are quick, almost instantaneous; however as a player progresses in the game the amount of time, effort and level of complexity is increased until progression becomes almost imperceptible.

Several studies have focused on specific opportunities and risks within MMORPG environments. Waters (2007) illustrates the benefits of using MMORPGs as a pedagogical tool for educators whilst Cole (2007) and Chen et. al (2008) highlight the level of social and emotional support fostered between players. On the negative side, Griffiths and Hunt (1995) and Lemmens et. al (2009) discuss the detrimental impacts of pathological gaming and Foo et. al (2008) present evidence on motivations related to players characterised as 'griefers' who "stalk, hurl insults, extort, form gangs, kill and loot" (Pham, 2002). Qualitative studies have explored the social interactions and roles of gamers (Chen et. al. 2008), and survey studies have revealed that many players are motivated by the social factor of MMORPGs (Yee, 2006). Existing literature surrounding the plethora of opportunities and risks in Internet based communication platforms (e.g. instant messaging, forums, social networking sites) highlights the potential manifestation of opportunities and risks through peer-to-peer interaction (Hasebrink et. al. 2009; Livingstone and Haddon, 2009). With this in mind, there is a clear requirement for evidence based research on the opportunities and risks of social interaction in MMORPG environments.

Methods

Quantitative research methods were utilised by the authors to measure addiction, player behaviour and levels of data disclosure within MMORPG environments. Hammersley (1987) proposes that quantitative measurement is most often addressed by means of well-established concepts of validity and reliability. With this in mind the two survey studies conducted by the authors (Sanders et. al. 2010a; 2010b) used well-established, reliable and valid constructs. Player behaviour was measured using Bolino and Turnley's (2003) Impression Management scale together with Deci and Ryan's (2000) Self Determination Theory (SDT) construct. Impression management is the process through which people try to control the impressions other people form of them. It is a goal directed conscious or unconscious attempt to influence the perceptions of other people about a person, object, or event by regulating and controlling information in social interaction. The impression management scale was adapted to fit the context of online gaming. Their taxonomy includes: *self promotion* (pointing out ones abilities or accomplishments in order to be seen as competent by observers)*, ingratiation* (using flattery or favours to elicit an attribution of likability from observers)*, exemplification* (self sacrifice or going above and beyond the call of duty in order to gain the attribution of dedication from observers – (this subscale was omitted as it was considered irrelevant to

MMORPG environments)), *intimidation* (signalling of power or potential to punish in order to be seen as dangerous by observers) *and supplication* (advertising weaknesses or shortcomings in order to elicit an attribution of being needy from observers).

According to Deci and Ryan's (2000) Self Determination Theory (SDT), for an individual to develop and function in a healthy and optimal way the following fundamental needs must be continually satisfied: *autonomy,* (the condition of being autonomous; self-government, or the right of self-government; independence), *relatedness* (association or connection to others) *and competence* (possession of required skill, knowledge, qualification, or capacity; of sufficient quality).

Addiction was measured using a 22 item Game Addiction Scale (GAS) developed and validated by Lemmens et al. (2009) based on Griffths and Hunt's (1995) original six point behavioural addiction criteria. Risks to privacy were measured using an average score of data types previously disclosed within the MMORPG environments and users were classified as either high or low risk depending on their average score (Sanders et. al. 2010). The three aforementioned scales were adopted as each had previously been rigorously tested for reliability and validity.

In addition to the quantitative method outlined above, participants were invited to provide more qualitative data on their personal experiences in online gaming environments, thereby gathering a subjective in-depth insight into their feelings, experiences and motivations of behaviour which could not necessarily be captured by the objective quantitative approach (Lobe et. al. 2007). For the minimisation of risk and optimisation of opportunities to be effective a sound understanding of context is required. Therefore, the combination of both quantitative and qualitative approaches provided both breadth of coverage and depth of understanding.

Empirical findings on player behaviour, basic needs satisfaction, behavioural addiction and levels of data disclosure in MMORPG environments were sought through two online surveys. The first survey which recruited a total of 357 participants from the west (Europe), investigated risks related to pathological gaming and its causal relationship to privacy and levels of personal and sensitive data disclosure.

The second survey consisting of 188 Singaporean gamers built on the findings of the first and sought to identify specific behaviour types and levels of needs satisfaction in online gaming environments. These findings, in some instances, positively or negatively influenced the probability of the identified opportunities and risks found in the first study. In addition, addiction and data disclosure were measured in the second survey to facilitate a cross-national comparison.

Findings

Evidence collated from previous studies (Chen et. al. 2008; Yee, 2006; Hasebrink et. al. 2009) together with the aforementioned survey findings (Sanders et. al. 2010a; Sanders et. al. 2010b) suggests that factors unique to MMORPG environments create emerging opportunities and risks for gamers.

EU Study

As a starting point, the EU survey sought to assess levels of addiction, time spent online, social impact lifestyle impact and the potential for harm and risk to privacy through engagement in MMORPG environments. The key findings of this research are summarised below:

Demographic

- 86% of respondents were male
- The average age of respondents was $M = 25.7$ years ($SD = 4.32$)
- European gamers spent on average 5.37 ($SD = 1.81$) days per week, $M = 4.37$ ($SD = 1.64$) hours per weekday and $M = 5.72$ ($SD = 1.25$) hours per weekend playing MMORPGs
- The most popular online game was World of Warcraft (67%)
- 53% of EU participants stated they would prefer to live in the online gaming world as opposed to the real world if given the choice.

Addiction

- 20% openly admitted to being addicted to MMORPGs of which 17% felt that they could not give up on their own.
- 23% were classified as behaviourally addicted to MMORPGs in line with the Game Addiction Scale (GAS) and Griffith's (1998) six point criteria framework.
- 29% have attempted to cut down the amount of time they spend on MMORPGs but were unsuccessful.
- 63% found themselves spending increasing amounts of time online.
- 85% frequently found themselves staying up until late into the evening playing MMORPGs.
- 80% often found themselves thinking about the game when they were not physically playing.

Social Impact

- 84% believe that their online gaming habit has had a negative effect on their real world social life.

- 53% prefer to socialise within MMORPG environments than with real world offline friends.
- 52% found playing an MMORPG more exciting than going out with friends.
- 51% find interacting with online friends easier than conversing with real world friends.
- 80% had formed particularly close friendships with other MMORPG players.
- 96% discussed personal issues not related to game play with fellow players.

Potential for Harm and Privacy Risks

- 89% had previously divulged personal and sensitive data in an MMORPG environment, including age (81%), location (77%), and email addresses (48%).
- 38% sent personal pictures to online friends upon request
- 22% previously divulged personal telephone numbers.
- 10% had divulged credentials upon request.
- 45% had previously become suspicious of other players behaviour whilst playing MMORPGs. Concerns included stalking, harassment, racism, stealing online currency and assets, extreme aggressive behaviour.

The second stage of the EU study comprised of semi-structured interviews with participants who were classified as behaviourally addicted to MMORPGs. This approach enabled the researchers to explore the contextual issues surrounding player's addiction and semi structured questions were used to examine the consequential impact of pathological gaming. Participants responses were transcribed verbatim and semi structured questions were scored with percentile values.

- 17% felt they were addicted to their game and could not live without it.
- 66% stated that MMORPGs provided them with a sense of purpose and invoked a feeling of being valued and respected.
- 47% were either married or had a family. 84% of these admitted that their online gaming activities had a negative impact on their family life and 8% stated that their online gaming had contributed to family breakup.
- 16% acknowledged that they had previously encountered one or more social engineering style attacks within the online gaming environment with 5% of participants being victims of such attacks.
- 38% had previously met online based friends in person and 20% of these found the real life meeting much different than expected.

It is commonly acknowledged that privacy and disclosure of personal and sensitive data is considered to be one of the most significant risks in the online domain. With this in mind a strong positive correlation (r (N =357) = .985 p < .001) was found between addiction and data disclosure, suggesting that

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pathological online gamers are more likely to disclose greater amounts of personal and sensitive data than non pathological online gamers.

The findings of the EU study provided further clarification and insight into the commonly acknowledged risks inherent in online gaming arenas. In contrast, however, many participants praised the opportunities experienced in MMORPGs with many gamers highlighting the highly social element. Many participants enjoy networking with like minded people and discussing both game related topics as well as more personal issues. High levels of trust between players were evident from participant responses and some perceive the online gaming environment to be far safer in comparison with real world society.

> "I'm a guild master in World of Warcraft. I have many good friends in WoW and we look after and protect each other. My role as guild master is important and my group members respect me and follow my command. I have met many good loyal friends online who I discuss many issues with. I play the game for several hours a day and find it a very positive social experience" [Male, 18 – 21]

> "It's safer than going out on a Friday/Saturday night, i.e. no physical harm when playing online. Plus it's a lot cheaper" [Male, 18 – 21]

> "I enjoy socializing with like minded people. We all have something in common and I found communicating with people online much easier than with people offline" [Male, 25-29]

Participants commented upon the diverse range of roles and attributes of their avatar characters and the perceptions of equality within the online gaming arena. Others highlight the potential for self expression and the adoption of leadership roles and some players believe that communication with family and friends in the online gaming environment has strengthened their offline real world communication.

> "I feel important and valued when I play EverQuest. People listen to me and take notice of what I have to say. Nobody judges you on your looks or way you dress. Everybody is equal and respected." [Female, 18 - 21]

> "I have played MMORPGs with my wife for nearly two years. We take different roles and approaches in game. My wife is more passive where as I am more active and adopt more of a leadership role. We have developed more ways of communicating together" [Male, 30 - 39]

The quantitative findings juxtaposed with the evidence collated from the semi-structured interviews provided a sound evidence base on which to further explore the opportunities and risks in online gaming environments. In the context of MMORPGs and other online environments many opportunities and risks emerge from contact with other gamers; as such the second study explored factors which directly contributed and affected social interaction, namely: player behaviour, impression management and basic needs satisfaction.

Singaporean Study

Building on the findings of the EU study, the second survey study conducted amongst Singaporean participants explored impression management behaviour and the level of basic needs satisfaction derived from engagement within the MMORPG environment. The findings are summarised below:

Demographic

- 74% of respondents were male
- The average age of respondents was (*M*=22.6 years, *SD = 2.21 years*)
- Singaporean gamers spent on average 4.69 (*SD* = 2.17) days per week, M = 4.42 (*SD* = 5.43) hours per weekday and *M* = 4.48 (*SD* = 3.31) hours per weekend playing MMORPGs
- The most popular online game was World of Warcraft (32%)
- 31% of Singaporean participants stated they would prefer to live in the online gaming world as opposed to the real world if given the choice.

Avatars

Just under one third of respondents (31%) used 5 or more avatars in the MMORPG they spent the most time playing. 40% used between 2 and 4 different avatars and just under a third (29%) only used 1 avatar. Only 13% of participants previously sold their avatar for real money and of these, 13% had regretted selling their character, highlighting the level of emotional attachment. In addition, 56% of participants had previously gender-swapped their avatar.

Lifestyle Impact

Participants were asked if they had a lifestyle choice of living in a virtual world environment or in the real world environment as we exist today. Almost one third of participants (31%) stated they would prefer to live in a virtual environment as opposed to the remaining respondents (69%) who would prefer to live in a real world environment. Moreover, a chi-squared test (X2) which compares the similarity of two distributions revealed that females showed no preference between the real (*n*=30) and virtual worlds (*n*=18), X2 (1, *N* = 48) = 3.00, *p* = .083, (where *n* denotes the category size and *N* denotes the sample size). However, a greater number of males prefer the real world (*n*=100) over the virtual world (*n*=40), X2 (1, *N* = 140) = 25.714, *p* = .001. These and other test statistics reported in this paper also provide a measure of the probability that the results are due to chance (*p*).

Addiction

Approximately one quarter (24%) of participants were classified as highly addicted to MMORPGs. Similar results were found for self-perceived addiction

with 80% of participants categorising themselves as moderately addicted and 20% categorising themselves as highly addicted. Regression analysis, which provides a measure of the usefulness of one or more variables in predicting another, found that participants who classified themselves as highly addicted typically obtained a high addiction score from the six point addiction construct ($R(N$=188) = .295 p < .001). In addition, males (M=3.4614, SD=.85390) typically exhibited higher levels of addiction to MMORPGs than females (M=3.0646, SD=1.00642). These differences were found to be statistically significant, t(186)=-2.446 p= .015), using an independent samples t-test (t) which compares the differences between the group means. There was however no significant difference in the number of hours spent playing MMORPGs between participants categorised as highly addicted (t(139)=-.810, p=.419) and those classified as moderately addicted (t(47)=.782, p=.438).

Impression Management

Participants with a subscale score of >4 (median value of 7 point Likert scale) were categorised as exhibiting high levels of self-promotion, ingratiation, intimidation or supplication and respondents with a score <=4 were categorised as exhibiting low levels of the aforementioned behaviours. The most common type of impression management behaviour exhibited within the MMORPG environment was ingratiation (high level 45%, low level 55%), illustrating that many players perceived their progression and development of in-game relationships was most effective when complimenting and praising fellow gamers. Self-promotion (high level 34%, low level 66%) was perceived to be the second most effective behaviour, whereby players talk about their experiences, achievements, accomplishments and talents in order to impress fellow gamers. Intimidation (high level 26%, low level 74%) was found to be less frequently adopted in online gaming, suggesting that players found aggression and awkward behaviour to be less of an effective tactic. In addition, supplication (high level 15%, low level 85%) was viewed as the least effective behaviour, suggesting players who constantly pretend to require assistance in an attempt to elicit help from fellow players found this to be relatively ineffective. There was no significant difference in the adoption of impression management techniques between male and female participants.

Basic Psychological Needs (SDT) of Online Gamers

Participants with a subscale score of >4 (median value of 7 point Likert scale) were categorised as experiencing high levels of autonomy, competence or relatedness and respondents with a score <=4 were categorised as experiencing low levels of the aforementioned behaviours. The results revealed that gamers' levels of autonomy (high level 83%, low level 17%) was the most satisfied basic psychological need. Relatedness (high level 52%, low level 48%) and competence (high level 52%, low level 48%) were satisfied to an equal degree. Participant subscale scores (autonomy, competence and relatedness) were averaged to give an overall measurement of needs satisfaction derived from MMORPGs. Respondents with an overall score of >4 (median value of 7

point Likert scale) were categorised as experiencing high levels of psychological needs satisfaction, where as respondents with a score of <=4 were categorised as experiencing low levels of psychological needs satisfaction. The majority of participants (69%) were found to be experiencing high levels of psychological needs satisfaction with approximately one third (31%) of participants experiencing low levels of satisfaction. There was however, no significant difference in basic psychological needs between genders.

Interaction with Fellow Gamers

The majority of participants (41%) mainly interact with online friends and some offline friends although an equal proportion of respondents (39%) interact mainly with offline friends and some online friends. Furthermore, 40% of respondents felt their relationship between their online and offline based friends were equally important to them.

Issues Discussed

Issues discussed within MMORPG environments varied considerably, with 66% of respondents frequently discussing game tactics, over one third (39%) often giving advice on personal issues and nearly a quarter (21%) frequently receiving advice on personal issues. Interestingly, over half of respondents (57%) rarely followed advice from fellow gamers on personal issues leaving 43% of respondents who occasionally followed advice on personal issues. The results also revealed a positive correlation between gamers that offered more advice on personal issues received more advice on personal issues (r (N=188) = .664 p < .001). Moreover, a positive correlation revealed that gamers who received greater amounts of advice on personal issues tended to follow the advice given to them more often (r (N=188) = .541 p < .001).

In-Person Meetings

Just over two thirds (67%) of participants had previously met an online based gamer in person. Of these, 13% found the meeting to be completely different to what they had expected it to be whilst one third (33%) had no prior expectations. There was however no difference in expectations between genders.

Potential for Harm and Privacy Risks

Each participant was given an overall disclosure score based on the number of data types they had previously disclosed within MMORPG environments. Participants with a disclosure score of >7 (median value) were categorised as high level disclosers and respondents with a score <=7 were categorised as low level disclosers. The study revealed high levels of data disclosure within MMORPGs environments with exactly 50% of respondents categorised as high

level disclosers, however there was no statistical difference between genders or age groups.

There was a weak positive correlation between the hours of game play per week and levels of data disclosure (r (N=188) = .150 p < .040), illustrating that participants who engage in MMORPG environments for excessive periods of time could be more likely to disclose greater amounts of personal and sensitive data. Moreover, a positive correlation between levels of addiction to MMORPGs and levels of data disclosure was found (r (N=188) = .286 p < .001).

An analysis of variance (ANOVA) on disclosure across interaction between fellow gamers revealed that the more gamers interacted with online based friends the higher the levels of disclosure (F(3, 184) = 3.323 p = .021). Moreover, post hoc tests showed that gamers who interacted with only offline based friends disclosed significantly less than people who interacted with some or all online based friends (all p <.02).

Positive correlations emerged between the SDT subscales and levels of data disclosure. Indeed, analysis showed a positive correlation between relatedness and data disclosure (r (N=188) = .432 p < .001) and competence and data disclosure (r (N=188) = .294 p < .001). However no correlation was found between autonomy and data disclosure.

Positive correlations emerged between the impression management subscales and levels of data disclosure. Indeed, analysis showed a positive correlation between self-promotion and data disclosure (r (N=188) = .347 p < .001), ingratiation and data disclosure (r (N=188) = .285 p < .001) and intimidation and data disclosure (r (N=188) = .257 p < .001). However no correlation was found between supplication and data disclosure.   These findings support theories by Joinson (2003) who found that the affordance of anonymity and hyper personal interaction encourages participants to disclose greater amounts of personal and sensitive information within online interactive environments.

Emerging Opportunities and Risks in MMORPG Environments

The research findings presented hitherto examined the effect of addiction on levels of data disclosure within Massively Multiplayer Online Role Playing Game environments together with an illustration of gamers' vulnerabilities to exploitation and predation. Results demonstrated significant relationships between pathological gaming and high levels of personal and sensitive data disclosure.   Furthermore, evidence suggests that in the majority of cases, prolonged immersion in online gaming environments erodes real life social communication with over half of the EU respondents preferring to socialise in the MMORPG arena and 53% stating they would prefer to live in the MMORPG environment if given a choice. In line with previous findings, the majority (80%) of MMORPG players had formed what they deemed to be particularly close friendships with other players and 96% discussed personal issues with fellow gamers, highlighting the high level of trust between players. Participants also highlighted the need for inter-player dependability for faster progression in the

game. High levels of perceived trust between players juxtaposed with high levels immersion and data disclosure presents an emerging avenue for exploitation and predation. To this end, just under half of EU participants had previously become suspicious of other players behaviour with some having encountered aggression, stalking, harassment, racism and stealing. Perceived levels of inter-player trust in game may have prompted 38% of participants to meet online based friends in person thereby increasing the potential for harm. Over half (56%) of the participants had previously gender-swapped their character. Qualitative responses revealed that players who adopted different personas elicited more benefits and advantages. Examples included greater levels of attraction from avatars of the opposite sex, increased control over other guild members and a decrease in unwanted contact from persistent male gamers.

Ingratiation and self promotion were found to be the most commonly adopted impression management behaviours in the online gaming arena suggesting that players found complementing and praising other players as well as talking about their own achievements and accomplishments to be the most effective communication strategy. In the context of online gaming, complimenting and praising other players would form an integral part of Joinson's (2003) hyper personal interaction theory in which online communicators optimise transmitted cues in order that the recipient builds an idealised view of the sender and thereby accelerating and intensifying the relationship formation. Previous evidence suggests that such behaviours have been adopted by predators to build relationships with vulnerable individuals. Juxtaposed with findings on addiction, immersion and data disclosure in MMORPG environments presents a clear and emerging avenue for exploitation.

In contrast, qualitative findings highlighted a number of positive social opportunities and enablement to develop new skills. Indeed, participants enjoyed networking with other like minded individuals from different geographical locations. Moreover, some participants perceived their online game as a place of equality in which they can learn new skills, teach and lead others and experiment with new identities. Others praised the peer-to-peer support fostered between players and the consequential raising of self confidence.

In line with evidence put forward by Yee (2006) participants were motivated by different facets of the game, with some enjoying the escapism into a fantasy world and others motivated by achievement and sense of empowerment. Several participants highlighted the growing business opportunities in the game and the development of entrepreneurial skills. Many players reported to have developed custom made add-ons and other opportunities to develop their imaginative and creative sides.

Combined evidence from the two survey studies, semi structured interviews and empirical findings from Yee (2006) and Griffiths and Hunt (1995), facilitated the identification of 12 opportunities and 12 risks as illustrated in Table 1. This is not an exhaustive list, but one compiled from the current evidence base.

Opportunities	Risks
Presents challenges, facilitates personal skills development	Tracking & harvesting personal data
Team work, collaboration, evaluation and reflection skills	Unwanted intrusion, data disclosure
Share knowledge, support, motive others	Creating and distributing malicious add-ons and plug-ins
Rewarded success, new challenges and opportunities	Desensitisation to violent, gruesome, harmful scenes
Adapting to new hierarchical social structures	Victim of griefing, trolling, cyber bullying
Advise and lead others	Harassing, cyber bullying another
Facilitates creativity and customisation of gaming experience	Desensitisation to sexual scenes
Using user generated content to enhance gaming experience	Unwanted contact and predatory behaviour. Being groomed
Create and publish user generated content	Erotic role play. Inappropriate sexual conduct
Emerging forms of self-other expression	Behavioural (operant) conditioning
Emerging dimensions of social engagement	Pathological gaming, behavioural addiction
Civic engagement, experimentation and expression of identity	Encouraging inappropriate, unhealthy behaviour

Table 1: Emerging Opportunities and Risks in MMORPG Environments

Conclusions

The combination of quantitative and qualitative methods gave a unique insight into the myriad of opportunities and risks encountered in Massively Multiplayer Online Role Playing environments. Analysis of the dataset revealed

opportunities and risks emerging from two distinct areas: contact with the structural characteristics of the environment and peer-to-peer contact. Evidence also suggested that the identified opportunities and risks were exacerbated as a result of players' behaviour and level of engagement in the environment. Furthermore, high levels of trust reinforced by the game dynamics gave rise to further potential for harm.

It is important to note the limitations of the research. The opportunities and risks presented in Table 1 emerged from the evidence based on participant responses. As such, the evidence base is subject to participants own interpretation of risk and their internal risk models. It is therefore suggested that further ethnographical research is undertaken in order to validate the opportunities and risks put forward by participants.

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Massively Multi-Player Online Role Playing Games: What's the Risk?

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Abstract

Some may argue that the proliferation of personal computers together with the widespread use of the Internet has brought many benefits to society. The popularity of the internet and its associated online services continues to grow at an exponential rate and consequently, so does the number of avenues for potential exploitation. Prior research has already established that sexual predators and social engineers use the Internet as a means to target and exploit individuals. Indeed, previous studies highlight the significant threats faced by users of instant messaging and social networking facilities. Online role-playing games and virtual environments provide yet another platform for users to interact with one another. Evidence suggests that subscribers of such services often become so immersed in a fantasy world that their ability to differentiate between the virtual and real world is reduced. This monograph investigates the level of threat faced by users of virtual environments and online role-playing games. The study made use of an online survey to assess the current level of awareness and understanding amongst individuals who spend excessive amounts of time engaging in such environments.

Keywords: MMORPG; Massively Multi-Player Online Role Playing Games; 3D; risk

Massively Multi-Player Online Role Playing Games: What's the Risk?

In recent years we have witnessed the rapid development and global embrace of Massively Multi-Player Online Role Playing Games (MMORPGs). MMORPGs provide subscribers with a graphically rich, fully immersive 3D fantasy world in which like-minded individuals can interact and collaborate to accomplish complex and challenging tasks. For some, however, these engrossing worlds have become an alternative lifestyle which takes precedence over reality (Öqvist, K.L., 2009).

Online privacy and social engineering are subjects of extensive research, and it is commonly acknowledged that the internet is embraced by individuals with darker motives. Awareness raising campaigns provide children with valuable information on how to protect themselves online, however, studies reveal that a lack of awareness amongst young online gamers could lead to negative consequences (Microsoft, 2010). Evidence suggests that MMORPG environments are becoming an emerging avenue for exploitation, yet millions of subscribers are divulging personal and sensitive data to fellow gamers with whom they have built, what they perceive to be, close relationships. In reality, however, many such relationships are formed with complete strangers and can lead to dangerous consequences with victims falling foul to attacks of grooming and social engineering to name but two (Gladwell, 2009).

The design of MMORPG environments not only forces participants to collaborate with complete strangers but also entices end-users to play continuously for an excessive number of hours. Evidence suggests that the addictiveness of such environments is not only damaging to mental health and general well-being, but is also leaving individuals vulnerable to exploitation. A recent study at the University of Plymouth investigated this issue with 362 online gamers; gamers were asked about their gaming habits and in-game security awareness (Sanders, Furnell, Dowland, 2009).

The study revealed that almost a quarter (23%) were classified as addicted to online gaming, with many players experiencing negative lifestyle changes as a result of their engagement with MMORPG's. The study collated the following evidence highlighting addictive tendencies:

- 29% attempted to cut down the amount of time spent playing MMORPG's but were unsuccessful.
- 63% found themselves spending increasing amounts of time online.
- 85% frequently found themselves staying up until late into the evening playing MMORPG's.
- 80% often found themselves thinking about the game when they were not physically playing

Such findings highlight the addictive nature of online gaming. Unfortunately the dangers associated with MMORPGs do not solely rest with excessive use. The study revealed that 80% of participants had formed particularly close friendships with fellow gamers whist 96% openly discussed personal issues not related to game play. The affordances of anonymity can create hyper-personal interaction between online participants, invoking more self-expression and idealised self-presentation. However, the combination of addiction intertwined with such hyper-interaction creates an emerging avenue for exploitation.

Indeed, the aforementioned statements correlated with further findings from the authors' study:

- 89% had previously divulged personal and sensitive data in an MMORPG environment, including age (81%), location (77%), and email addresses (48%).
- 38% sent personal pictures to online friends upon request.
- 22% previously divulged personal telephone numbers.
- 10% had divulged MMORPG account credentials upon request

In a previous study at the University of Plymouth, 86 respondents were surveyed about their security awareness within social networking environments. A comparison of both studies found that social networking users showed a greater level of awareness regarding the disclosure of personal and sensitive data within online interactive environments compared to MMORPG subscribers. Indeed, 61% of social networking participants disclosed their age compared with 81% of MMORPG subscribers, 10% their location compared to 77% and 52% their email addresses compared to 48%. (Sanders, Dowland, Furnell, 2009). The findings indicate that both

respondent groups share the same view of divulging email addresses but the respondent group's view of location differed significantly. The authors theorise that this is due to social networking being more closely linked to real-life, making users more aware of the dangers. In addition, Yee (2003) notes that MMORPG environments encourage idealisation of the self and the chivalric romance embraced in such environments can potentially create a false sense of trust amongst players. Consequently this provides a heightened opportunity for predation and exploitation.

In addition, almost half (45%) of respondents had become suspicious of other players' behaviour whilst engaging with MMORPGs. Respondents reported concerns including: stalking, harassment, racism, stealing of online currency and property, and extreme aggressive behaviour. Further case studies at the University of Plymouth revealed that of the 23% who were classified as behaviourally addicted to MMORPGs, 16% have been subject to social engineering attacks, of which 5% fell victim to successful attacks including fraud and being duped into sending sexually explicit pictures.

In a more recent study, the authors undertook an identical body of work in Greece, supported by the University of the Aegean. 100 respondents were surveyed on their security awareness within MMORPG environments. The results between the two studies proved to be very similar. Indeed, 82% of Greek MMORPG subscribers disclosed their age compared with 81% of English subscribers and 64% their location in contrast to 77%. In addition, 61% revealed their real name and 45% their interests. Moreover, 42% of Greek MMORPG subscribers disclosed their email addresses compared to 48% from the previous study, 27% their personal pictures compared to 38%, 22% their personal telephone numbers in contrast to 21%. The results give a clear indication that the majority of MMORPG subscribers consider their virtual data to be of greater importance than their personal data. However, previous studies highlight the potential dangers associated with the aggregation of personal and sensitive data.

The findings present clear evidence that security awareness amongst online gamers is an area for concern and further research. Moreover, there are few technological frameworks implemented within MMORPG infrastructures that protect the online gamer, therefore creating the need for awareness raising to cultivate an effective security culture amongst the gaming population. To achieve the aforementioned aims, continued efforts to educate the end-user must be applied to increase understanding and minimise the risks inherent with MMORPG engagement.

This places an onus on MMORPG vendors to provide appropriate safeguards and awareness raising information about security. These findings give scope for the development of a technological risk reduction framework to be within MMORPG environments. While popular media stories suggest that the internet is full of predators and any form of online engagement can lead to exploitation, abstinence from certain parts of the internet may be the wrong message. There is an increasing body of thought that points to the value of effective awareness raising .

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EMERGING OPPORTUNITIES AND RISKS IN MASSIVELY MULTIPLAYER ONLINE ROLE PLAYING GAMES

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ABSTRACT

Massively Multiplayer Online Role Playing Games (MMORPG's) are highly immersive environments which promote and sustain hyper personal interaction amongst players. This body of work aimed to identify, compare and draw conclusions from existing and ongoing research on player behaviour, motivations, addiction, data disclosure and the potential for harm in MMORPGs. Two quantitative survey based studies and a series of semi structured interviews formed the evidence base for the research findings. The first quantitative study consisted of European participants (n=357) and the second of Singaporean participants (n=188). In addition the European study encompassed qualitative findings from semi structured interviews.

Player behaviour was measured using Bolino and Turnley's (2003) Impression Management (IM) Scale adapted to fit the context of online gaming. An adapted Basic Psychological Needs scale from Deci and Ryan's (2000) Self Determination Theory (SDT) was used to measure the degree to which online gaming fulfils the basic psychological needs of the participant gamer. Addiction was measured using the Game Addiction Scale (GAS) developed by Lemmens et. al. (2009) and data disclosure was measured and scored based on the number of data types previously disclosed within MMORPG environments. Participants exhibited varying levels of addiction and over half were found to be high level disclosers of personal and sensitive data, making them potentially more vulnerable to exploitation and predation. Hours of game play was found to

influence data disclosure indicating that participants who engage in MMORPG environments for excessive periods of time could be more likely to disclose greater amounts of personal and sensitive data. Significant correlations were found between addiction and data disclosure highlighting that players who exhibit higher levels of addiction to MMORPGs typically disclose greater amounts of data. Players perceived their progression and development of in-game relationships was most effective when complimenting and praising fellow gamers. Self promotion was found to be the second most effective behaviour whereby players talk about their experiences, achievements, accomplishments and talents in order to impress fellow gamers. Intimidation and supplication were found to be the least effective impression management behaviours.

Many participants exhibited a susceptibility to harm as 67% had previously met an online based gaming acquaintance in person. Other gamers reported falling foul to one or more social engineering attacks including: stealing of account credentials and character abilities, fraud and transmission of sexually oriented pictures. The evidence base found that a) addiction to online games increases levels of data disclosure b) the unique structural characteristics of MMORPGs adds new dimensions to social interactions introducing emerging risks and vulnerabilities (including increased levels of trust, inter-player dependency and consequential privacy risks through data disclosure), c) self-promotion was found to strengthen inter-player relationships and d) engagement in online games in many cases fulfils players basic psychological needs of autonomy, competence and relatedness.

Introduction

Massively Multiplayer Online Role Playing Game's (MMORPG) are unique, fully immersive environments housing populations of characters with their own varying experiences, assets and values (Öqvist, 2009). MMORPGs are highly social arenas consisting of platforms where players can chat and interact with one another whilst participating in a fantasy world with like minded individuals (Chen et. al. 2008). These environments have evolved from traditional single-player games to global communities in which end users can meet other gamers and build reputations based on their performance and ability to meet common goals (Yee, 2006).

Structural characteristics of MMORPGs differentiate these environments from other online interactive platforms (e.g. instant messengers and email). Players can create one or more visual representations of themselves known as avatars which enable them to experiment with and explore different identities (e.g. gender and class). Avatars hold different sets of professions or roles that the MMORPG provides and the permanence and fluidity of roles varies depending on the design of the environment (Yee, 2006). Each role has varying strengths and weaknesses and the structural characteristics of many MMORPGs forces players to trust and become dependent on their more experienced counterparts.

MMORPG environments are infinite both in terms of size and ending. Based on Skinner's (1974) theory of behaviourism, goals and rewards typically use a random ratio reinforcement schedule based on operant conditioning (Yee, 2006; Yee, 2004). Hence, in the context of MMORPGs, early achievements are quick, almost instantaneous; however as a player progresses in the game the amount of time, effort and level of complexity is increased until progression becomes almost imperceptible.

Several studies have focused on specific opportunities and risks within MMORPG environments. Waters (2007) illustrates the benefits of using MMORPGs as a pedagogical tool for educators whilst Cole (2007) and Chen et. al (2008) highlight the level of social and emotional support fostered between players. On the negative side, Griffiths and Hunt (1995) and Lemmens et. al (2009) discuss the detrimental impacts of pathological gaming and Foo et. al (2008) present evidence on motivations related to players characterised as 'griefers' who "stalk, hurl insults, extort, form gangs, kill and loot" (Pham, 2002). Qualitative studies have explored the social interactions and roles of gamers (Chen et. al. 2008), and survey studies have revealed that many players are motivated by the social factor of MMORPGs (Yee, 2006). Existing literature surrounding the plethora of opportunities and risks in Internet based communication platforms (e.g. instant messaging, forums, social networking sites) highlights the potential manifestation of opportunities and risks through peer-to-peer interaction (Hasebrink et. al. 2009; Livingstone and Haddon, 2009). With this in mind, there is a clear requirement for evidence based research on the opportunities and risks of social interaction in MMORPG environments.

Methods

Quantitative research methods were utilised by the authors to measure addiction, player behaviour and levels of data disclosure within MMORPG environments. Hammersley (1987) proposes that quantitative measurement is most often addressed by means of well-established concepts of validity and reliability. With this in mind the two survey studies conducted by the authors (Sanders et. al. 2010a; 2010b) used well-established, reliable and valid constructs. Player behaviour was measured using Bolino and Turnley's (2003) Impression Management scale together with Deci and Ryan's (2000) Self Determination Theory (SDT) construct. Impression management is the process through which people try to control the impressions other people form of them. It is a goal directed conscious or unconscious attempt to influence the perceptions of other people about a person, object, or event by regulating and controlling information in social interaction. The impression management scale was adapted to fit the context of online gaming. Their taxonomy includes: *self promotion* (pointing out ones abilities or accomplishments in order to be seen as competent by observers)*, ingratiation* (using flattery or favours to elicit an attribution of likability from observers)*, exemplification* (self sacrifice or going above and beyond the call of duty in order to gain the attribution of dedication from observers – (this subscale was omitted as it was considered irrelevant to

MMORPG environments)), *intimidation* (signalling of power or potential to punish in order to be seen as dangerous by observers) *and supplication* (advertising weaknesses or shortcomings in order to elicit an attribution of being needy from observers)*.*

According to Deci and Ryan's (2000) Self Determination Theory (SDT), for an individual to develop and function in a healthy and optimal way the following fundamental needs must be continually satisfied: *autonomy,* (the condition of being autonomous; self-government, or the right of self-government; independence), *relatedness* (association or connection to others) *and competence* (possession of required skill, knowledge, qualification, or capacity; of sufficient quality)*.*

Addiction was measured using a 22 item Game Addiction Scale (GAS) developed and validated by Lemmens et al. (2009) based on Griffths and Hunt's (1995) original six point behavioural addiction criteria. Risks to privacy were measured using an average score of data types previously disclosed within the MMORPG environments and users were classified as either high or low risk depending on their average score (Sanders et. al. 2010).   The three aforementioned scales were adopted as each had previously been rigorously tested for reliability and validity.

In addition to the quantitative method outlined above, participants were invited to provide more qualitative data on their personal experiences in online gaming environments, thereby gathering a subjective in-depth insight into their feelings, experiences and motivations of behaviour which could not necessarily be captured by the objective quantitative approach (Lobe et. al. 2007). For the minimisation of risk and optimisation of opportunities to be effective a sound understanding of context is required.   Therefore, the combination of both quantitative and qualitative approaches provided both breadth of coverage and depth of understanding.

Empirical findings on player behaviour, basic needs satisfaction, behavioural addiction and levels of data disclosure in MMORPG environments were sought through two online surveys. The first survey which recruited a total of 357 participants from the west (Europe), investigated risks related to pathological gaming and its causal relationship to privacy and levels of personal and sensitive data disclosure.

The second survey consisting of 188 Singaporean gamers built on the findings of the first and sought to identify specific behaviour types and levels of needs satisfaction in online gaming environments. These findings, in some instances, positively or negatively influenced the probability of the identified opportunities and risks found in the first study. In addition, addiction and data disclosure were measured in the second survey to facilitate a cross-national comparison.

Findings

Evidence collated from previous studies (Chen et. al. 2008; Yee, 2006; Hasebrink et. al. 2009) together with the aforementioned survey findings (Sanders et. al. 2010a; Sanders et. al. 2010b) suggests that factors unique to MMORPG environments create emerging opportunities and risks for gamers.

EU Study

As a starting point, the EU survey sought to assess levels of addiction, time spent online, social impact lifestyle impact and the potential for harm and risk to privacy through engagement in MMORPG environments. The key findings of this research are summarised below:

Demographic

- 86% of respondents were male
- The average age of respondents was $M = 25.7$ years ($SD = 4.32$)
- European gamers spent on average 5.37 ($SD = 1.81$) days per week, $M = 4.37$ ($SD = 1.64$) hours per weekday and $M = 5.72$ ($SD = 1.25$) hours per weekend playing MMORPGs
- The most popular online game was World of Warcraft (67%)
- 53% of EU participants stated they would prefer to live in the online gaming world as opposed to the real world if given the choice.

Addiction

- 20% openly admitted to being addicted to MMORPGs of which 17% felt that they could not give up on their own.
- 23% were classified as behaviourally addicted to MMORPGs in line with the Game Addiction Scale (GAS) and Griffith's (1998) six point criteria framework.
- 29% have attempted to cut down the amount of time they spend on MMORPGs but were unsuccessful.
- 63% found themselves spending increasing amounts of time online.
- 85% frequently found themselves staying up until late into the evening playing MMORPGs.
- 80% often found themselves thinking about the game when they were not physically playing.

Social Impact

- 84% believe that their online gaming habit has had a negative effect on their real world social life.

- 53% prefer to socialise within MMORPG environments than with real world offline friends.
- 52% found playing an MMORPG more exciting than going out with friends.
- 51% find interacting with online friends easier than conversing with real world friends.
- 80% had formed particularly close friendships with other MMORPG players.
- 96% discussed personal issues not related to game play with fellow players.

Potential for Harm and Privacy Risks

- 89% had previously divulged personal and sensitive data in an MMORPG environment, including age (81%), location (77%), and email addresses (48%).
- 38% sent personal pictures to online friends upon request
- 22% previously divulged personal telephone numbers.
- 10% had divulged credentials upon request.
- 45% had previously become suspicious of other players behaviour whilst playing MMORPGs. Concerns included stalking, harassment, racism, stealing online currency and assets, extreme aggressive behaviour.

The second stage of the EU study comprised of semi-structured interviews with participants who were classified as behaviourally addicted to MMORPGs. This approach enabled the researchers to explore the contextual issues surrounding player's addiction and semi structured questions were used to examine the consequential impact of pathological gaming. Participants responses were transcribed verbatim and semi structured questions were scored with percentile values.

- 17% felt they were addicted to their game and could not live without it.
- 66% stated that MMORPGs provided them with a sense of purpose and invoked a feeling of being valued and respected.
- 47% were either married or had a family. 84% of these admitted that their online gaming activities had a negative impact on their family life and 8% stated that their online gaming had contributed to family breakup.
- 16% acknowledged that they had previously encountered one or more social engineering style attacks within the online gaming environment with 5% of participants being victims of such attacks.
- 38% had previously met online based friends in person and 20% of these found the real life meeting much different than expected.

It is commonly acknowledged that privacy and disclosure of personal and sensitive data is considered to be one of the most significant risks in the online domain. With this in mind a strong positive correlation (r (N =357) = .985 p < .001) was found between addiction and data disclosure, suggesting that

pathological online gamers are more likely to disclose greater amounts of personal and sensitive data than non pathological online gamers.

The findings of the EU study provided further clarification and insight into the commonly acknowledged risks inherent in online gaming arenas. In contrast, however, many participants praised the opportunities experienced in MMORPGs with many gamers highlighting the highly social element. Many participants enjoy networking with like minded people and discussing both game related topics as well as more personal issues. High levels of trust between players were evident from participant responses and some perceive the online gaming environment to be far safer in comparison with real world society.

> "I'm a guild master in World of Warcraft. I have many good friends in WoW and we look after and protect each other. My role as guild master is important and my group members respect me and follow my command. I have met many good loyal friends online who I discuss many issues with. I play the game for several hours a day and find it a very positive social experience" [Male, 18 – 21]

> "It's safer than going out on a Friday/Saturday night, i.e. no physical harm when playing online. Plus it's a lot cheaper" [Male, 18 – 21]

> "I enjoy socializing with like minded people. We all have something in common and I found communicating with people online much easier than with people offline" [Male, 25-29]

Participants commented upon the diverse range of roles and attributes of their avatar characters and the perceptions of equality within the online gaming arena. Others highlight the potential for self expression and the adoption of leadership roles and some players believe that communication with family and friends in the online gaming environment has strengthened their offline real world communication.

> "I feel important and valued when I play EverQuest. People listen to me and take notice of what I have to say. Nobody judges you on your looks or way you dress. Everybody is equal and respected." [Female, 18 - 21]

> "I have played MMORPGs with my wife for nearly two years. We take different roles and approaches in game. My wife is more passive where as I am more active and adopt more of a leadership role. We have developed more ways of communicating together" [Male, 30 - 39]

The quantitative findings juxtaposed with the evidence collated from the semi-structured interviews provided a sound evidence base on which to further explore the opportunities and risks in online gaming environments. In the context of MMORPGs and other online environments many opportunities and risks emerge from contact with other gamers; as such the second study explored factors which directly contributed and affected social interaction, namely: player behaviour, impression management and basic needs satisfaction.

Singaporean Study

Building on the findings of the EU study, the second survey study conducted amongst Singaporean participants explored impression management behaviour and the level of basic needs satisfaction derived from engagement within the MMORPG environment. The findings are summarised below:

Demographic

- 74% of respondents were male
- The average age of respondents was (M=22.6 years, $SD = 2.21$ *years*)
- Singaporean gamers spent on average 4.69 ($SD = 2.17$) days per week, M = 4.42 ($SD = 5.43$) hours per weekday and $M = 4.48$ ($SD = 3.31$) hours per weekend playing MMORPGs
- The most popular online game was World of Warcraft (32%)
- 31% of Singaporean participants stated they would prefer to live in the online gaming world as opposed to the real world if given the choice.

Avatars

Just under one third of respondents (31%) used 5 or more avatars in the MMORPG they spent the most time playing. 40% used between 2 and 4 different avatars and just under a third (29%) only used 1 avatar. Only 13% of participants previously sold their avatar for real money and of these, 13% had regretted selling their character, highlighting the level of emotional attachment. In addition, 56% of participants had previously gender-swapped their avatar.

Lifestyle Impact

Participants were asked if they had a lifestyle choice of living in a virtual world environment or in the real world environment as we exist today. Almost one third of participants (31%) stated they would prefer to live in a virtual environment as opposed to the remaining respondents (69%) who would prefer to live in a real world environment. Moreover, a chi-squared test (X2) which compares the similarity of two distributions revealed that females showed no preference between the real (n=30) and virtual worlds (n=18), X2 (1, $N = 48$) = 3.00, $p = .083$, (where n denotes the category size and N denotes the sample size). However, a greater number of males prefer the real world (n=100) over the virtual world (n=40), X2 (1, $N = 140$) = 25.714, $p = .001$. These and other test statistics reported in this paper also provide a measure of the probability that the results are due to chance (p).

Addiction

Approximately one quarter (24%) of participants were classified as highly addicted to MMORPGs. Similar results were found for self-perceived addiction

with 80% of participants categorising themselves as moderately addicted and 20% categorising themselves as highly addicted. Regression analysis, which provides a measure of the usefulness of one or more variables in predicting another, found that participants who classified themselves as highly addicted typically obtained a high addiction score from the six point addiction construct (R(N=188) = .295 $p < .001$). In addition, males (M=3.4614, SD=.85390) typically exhibited higher levels of addiction to MMORPGs than females (M=3.0646, SD=1.00642). These differences were found to be statistically significant, t(186)=-2.446 $p= .015$), using an independent samples t-test (t) which compares the differences between the group means. There was however no significant difference in the number of hours spent playing MMORPGs between participants categorised as highly addicted (t(139)=-.810, p=.419) and those classified as moderately addicted (t(47)=.782, p=.438).

Impression Management

Participants with a subscale score of >4 (median value of 7 point Likert scale) were categorised as exhibiting high levels of self-promotion, ingratiation, intimidation or supplication and respondents with a score <=4 were categorised as exhibiting low levels of the aforementioned behaviours. The most common type of impression management behaviour exhibited within the MMORPG environment was ingratiation (high level 45%, low level 55%), illustrating that many players perceived their progression and development of in-game relationships was most effective when complimenting and praising fellow gamers. Self-promotion (high level 34%, low level 66%) was perceived to be the second most effective behaviour, whereby players talk about their experiences, achievements, accomplishments and talents in order to impress fellow gamers. Intimidation (high level 26%, low level 74%) was found to be less frequently adopted in online gaming, suggesting that players found aggression and awkward behaviour to be less of an effective tactic. In addition, supplication (high level 15%, low level 85%) was viewed as the least effective behaviour, suggesting players who constantly pretend to require assistance in an attempt to elicit help from fellow players found this to be relatively ineffective. There was no significant difference in the adoption of impression management techniques between male and female participants.

Basic Psychological Needs (SDT) of Online Gamers

Participants with a subscale score of >4 (median value of 7 point Likert scale) were categorised as experiencing high levels of autonomy, competence or relatedness and respondents with a score <=4 were categorised as experiencing low levels of the aforementioned behaviours. The results revealed that gamers' levels of autonomy (high level 83%, low level 17%) was the most satisfied basic psychological need. Relatedness (high level 52%, low level 48%) and competence (high level 52%, low level 48%) were satisfied to an equal degree. Participant subscale scores (autonomy, competence and relatedness) were averaged to give an overall measurement of needs satisfaction derived from MMORPGs. Respondents with an overall score of >4 (median value of 7

point Likert scale) were categorised as experiencing high levels of psychological needs satisfaction, where as respondents with a score of <=4 were categorised as experiencing low levels of psychological needs satisfaction. The majority of participants (69%) were found to be experiencing high levels of psychological needs satisfaction with approximately one third (31%) of participants experiencing low levels of satisfaction. There was however, no significant difference in basic psychological needs between genders.

Interaction with Fellow Gamers

The majority of participants (41%) mainly interact with online friends and some offline friends although an equal proportion of respondents (39%) interact mainly with offline friends and some online friends. Furthermore, 40% of respondents felt their relationship between their online and offline based friends were equally important to them.

Issues Discussed

Issues discussed within MMORPG environments varied considerably, with 66% of respondents frequently discussing game tactics, over one third (39%) often giving advice on personal issues and nearly a quarter (21%) frequently receiving advice on personal issues. Interestingly, over half of respondents (57%) rarely followed advice from fellow gamers on personal issues leaving 43% of respondents who occasionally followed advice on personal issues. The results also revealed a positive correlation between gamers that offered more advice on personal issues received more advice on personal issues (r (N=188) = .664 p < .001). Moreover, a positive correlation revealed that gamers who received greater amounts of advice on personal issues tended to follow the advice given to them more often (r (N=188) = .541 p < .001).

In-Person Meetings

Just over two thirds (67%) of participants had previously met an online based gamer in person. Of these, 13% found the meeting to be completely different to what they had expected it to be whilst one third (33%) had no prior expectations. There was however no difference in expectations between genders.

Potential for Harm and Privacy Risks

Each participant was given an overall disclosure score based on the number of data types they had previously disclosed within MMORPG environments. Participants with a disclosure score of >7 (median value) were categorised as high level disclosers and respondents with a score <=7 were categorised as low level disclosers. The study revealed high levels of data disclosure within MMORPGs environments with exactly 50% of respondents categorised as high

level disclosers, however there was no statistical difference between genders or age groups.

There was a weak positive correlation between the hours of game play per week and levels of data disclosure (r (N=188) = .150 p < .040), illustrating that participants who engage in MMORPG environments for excessive periods of time could be more likely to disclose greater amounts of personal and sensitive data. Moreover, a positive correlation between levels of addiction to MMORPGs and levels of data disclosure was found (r (N=188) = .286 p < .001).

An analysis of variance (ANOVA) on disclosure across interaction between fellow gamers revealed that the more gamers interacted with online based friends the higher the levels of disclosure (F(3, 184) = 3.323 p = .021). Moreover, post hoc tests showed that gamers who interacted with only offline based friends disclosed significantly less than people who interacted with some or all online based friends (all p <.02).

Positive correlations emerged between the SDT subscales and levels of data disclosure. Indeed, analysis showed a positive correlation between relatedness and data disclosure (r (N=188) = .432 p < .001) and competence and data disclosure (r (N=188) = .294 p < .001). However no correlation was found between autonomy and data disclosure.

Positive correlations emerged between the impression management subscales and levels of data disclosure. Indeed, analysis showed a positive correlation between self-promotion and data disclosure (r (N=188) = .347 p < .001), ingratiation and data disclosure (r (N=188) = .285 p < .001) and intimidation and data disclosure (r (N=188) = .257 p < .001). However no correlation was found between supplication and data disclosure.   These findings support theories by Joinson (2003) who found that the affordance of anonymity and hyper personal interaction encourages participants to disclose greater amounts of personal and sensitive information within online interactive environments.

Emerging Opportunities and Risks in MMORPG Environments

The research findings presented hitherto examined the effect of addiction on levels of data disclosure within Massively Multiplayer Online Role Playing Game environments together with an illustration of gamers' vulnerabilities to exploitation and predation. Results demonstrated significant relationships between pathological gaming and high levels of personal and sensitive data disclosure.   Furthermore, evidence suggests that in the majority of cases, prolonged immersion in online gaming environments erodes real life social communication with over half of the EU respondents preferring to socialise in the MMORPG arena and 53% stating they would prefer to live in the MMORPG environment if given a choice. In line with previous findings, the majority (80%) of MMORPG players had formed what they deemed to be particularly close friendships with other players and 96% discussed personal issues with fellow gamers, highlighting the high level of trust between players. Participants also highlighted the need for inter-player dependability for faster progression in the

game. High levels of perceived trust between players juxtaposed with high levels immersion and data disclosure presents an emerging avenue for exploitation and predation. To this end, just under half of EU participants had previously become suspicious of other players behaviour with some having encountered aggression, stalking, harassment, racism and stealing. Perceived levels of inter-player trust in game may have prompted 38% of participants to meet online based friends in person thereby increasing the potential for harm. Over half (56%) of the participants had previously gender-swapped their character. Qualitative responses revealed that players who adopted different personas elicited more benefits and advantages. Examples included greater levels of attraction from avatars of the opposite sex, increased control over other guild members and a decrease in unwanted contact from persistent male gamers.

Ingratiation and self promotion were found to be the most commonly adopted impression management behaviours in the online gaming arena suggesting that players found complementing and praising other players as well as talking about their own achievements and accomplishments to be the most effective communication strategy. In the context of online gaming, complimenting and praising other players would form an integral part of Joinson's (2003) hyper personal interaction theory in which online communicators optimise transmitted cues in order that the recipient builds an idealised view of the sender and thereby accelerating and intensifying the relationship formation. Previous evidence suggests that such behaviours have been adopted by predators to build relationships with vulnerable individuals. Juxtaposed with findings on addiction, immersion and data disclosure in MMORPG environments presents a clear and emerging avenue for exploitation.

In contrast, qualitative findings highlighted a number of positive social opportunities and enablement to develop new skills. Indeed, participants enjoyed networking with other like minded individuals from different geographical locations. Moreover, some participants perceived their online game as a place of equality in which they can learn new skills, teach and lead others and experiment with new identities. Others praised the peer-to-peer support fostered between players and the consequential raising of self confidence.

In line with evidence put forward by Yee (2006) participants were motivated by different facets of the game, with some enjoying the escapism into a fantasy world and others motivated by achievement and sense of empowerment. Several participants highlighted the growing business opportunities in the game and the development of entrepreneurial skills. Many players reported to have developed custom made add-ons and other opportunities to develop their imaginative and creative sides.

Combined evidence from the two survey studies, semi structured interviews and empirical findings from Yee (2006) and Griffiths and Hunt (1995), facilitated the identification of 12 opportunities and 12 risks as illustrated in Table 1. This is not an exhaustive list, but one compiled from the current evidence base.

Opportunities	Risks
Presents challenges, facilitates personal skills development	Tracking & harvesting personal data
Team work, collaboration, evaluation and reflection skills	Unwanted intrusion, data disclosure
Share knowledge, support, motive others	Creating and distributing malicious add-ons and plug-ins
Rewarded success, new challenges and opportunities	Desensitisation to violent, gruesome, harmful scenes
Adapting to new hierarchical social structures	Victim of griefing, trolling, cyber bullying
Advise and lead others	Harassing, cyber bullying another
Facilitates creativity and customisation of gaming experience	Desensitisation to sexual scenes
Using user generated content to enhance gaming experience	Unwanted contact and predatory behaviour. Being groomed
Create and publish user generated content	Erotic role play. Inappropriate sexual conduct
Emerging forms of self-other expression	Behavioural (operant) conditioning
Emerging dimensions of social engagement	Pathological gaming, behavioural addiction
Civic engagement, experimentation and expression of identity	Encouraging inappropriate, unhealthy behaviour

Table 1: Emerging Opportunities and Risks in MMORPG Environments

Conclusions

The combination of quantitative and qualitative methods gave a unique insight into the myriad of opportunities and risks encountered in Massively Multiplayer Online Role Playing environments. Analysis of the dataset revealed

opportunities and risks emerging from two distinct areas: contact with the structural characteristics of the environment and peer-to-peer contact. Evidence also suggested that the identified opportunities and risks were exacerbated as a result of players' behaviour and level of engagement in the environment. Furthermore, high levels of trust reinforced by the game dynamics gave rise to further potential for harm.

It is important to note the limitations of the research. The opportunities and risks presented in Table 1 emerged from the evidence based on participant responses. As such, the evidence base is subject to participants own interpretation of risk and their internal risk models. It is therefore suggested that further ethnographical research is undertaken in order to validate the opportunities and risks put forward by participants.

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