

# Quality of Virtual Life (QOVL)

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## 1. Introduction

Current virtual worlds, such as Second Life, The Sims Online, HiPiHi, and There.com are visually rich three dimensional platforms for social and economic interaction that offer their users the ability to literally live virtual lives. In 2009, at any given point of time, upwards of 70,000 users can be found in avatar form inhabiting Second Life while its counterpart, HiPiHi, has been touted as the vanguard of a vast Chinese project to construct a network of virtual worlds capable of supporting billions of avatars (Keegan, 2007). Driven in part by “a whole generation of children...growing up on Club Penguin and Webkinz” (Anderson & Rainie, 2008, p. 88) over half of Internet industry experts interviewed by the Pew Internet & American Life Project agreed that by the year 2020, “most well-equipped Internet users will spend some part of their waking hours – at work and at play – at least partially linked to augmentations of the real world or alternate worlds” (Anderson & Rainie, 2008, p. 5). Within these complex immersive environments, the idea of virtual lives that are either complements or substitutes for one’s real world life is already a day-to-day reality for many virtual world users. While Web site visitors may evaluate the user experience of a particular Web site, the premise of this chapter is that for

virtual worlds, user experience is better viewed as the more expansive, multidimensional construct of quality of virtual life (QOVL). Consider as introduction the Amsterdam Digital City, an early experimentation in virtual community and social networking that provides an example of how quality of virtual life may be a critical factor in the user acceptance and success of a virtual world.

The Amsterdam Digital City (De Digitale Stad, DDS) was established in 1994 as a text-based digital public democratic forum for the citizens of Amsterdam (van den Besselaar & Beckers, 2005). It rapidly evolved from its political roots into a comprehensive Web site launched in 1995 based upon a city map metaphor, with cultural, recreational, technological, civic and political virtual offices rented by both commercial and non-profit organizations. The offices were organized into 35 city squares, each with a main office building and nine smaller offices. Neighborhoods were located adjacent to these offices, in which digital residents maintained a total of 1500 virtual houses, at no charge. The houses allowed residents to email each other and to share information. Emerging 3D virtual reality technology was an obvious next step given the DDS's metaphor of a real world city, but while DDS experimented with a 3D interface in 1997, its user's computers and Internet connections were not adequate to support these enhancements, so the interface remained a flat 2D Web-based map. The DDS population grew from an initial 10,000 citizens to a virtual community of 150,000 by the time of its decline and ultimate abandonment by its users in 2001 as DDS citizens defected to other Websites. Van den Besselaar & Beckers (2005) offer one intriguing explanation for this decline – DDS citizens “went elsewhere to find a better quality of virtual life.”

While some might dismiss this explanation and offer alternative explanations of “better usability” or “improved user experience,” those who have experienced the immersive nature of

virtual worlds might find themselves nodding in agreement with this explanation. The depth of user experience in virtual worlds is orders of magnitudes beyond that found in traditional Web sites. Hoffman and Novak (2009) argue that the social context, heightened interactivity, sense of place, manipulable environment, and dynamic learning process distinguish virtual worlds from conventional Web-based environments (Hoffman & Novak, 1996; Novak, Hoffman, & Yung, 2000).

Against this background, the question of the meaning of quality of virtual life within these worlds naturally arises – yet this question has been thus far unconsidered from a scientific research perspective. Some have speculated that virtual worlds might in some manner impact quality of life, for example that “virtual environments will be used to help lift people out of mental poverty, even when their real world is immersed in physical poverty” (Anderson & Rainie, 2008, p. 95). There is recognition that participation in virtual worlds can impact quality of life for those with physical disabilities. Virtual Ability Island in Second Life was recently awarded a \$10,000 annual prize by Linden Lab, given to the virtual world project that most improves real-world lives. The project, designed by Virtual Ability, offers resources to help people with real-world disabilities learn to use Second Life, where they can “skydive, fish, mountain climb, hike, and even fly.” As the project group’s president stated, “for many of us Second Life is not a game – it is a second chance at life” (AFP, 2009).

While experiences in virtual worlds may affect real world QOL, we may also directly consider QOVL, the quality of life experienced within virtual worlds themselves. Consideration of QOVL leads us to a range of important research questions. How do the underlying dimensions of quality of virtual life (QOVL) differ from those in the extensive literatures on real world quality of life (QOL) (Coons, Rao, Keininger, & Hays, 2000; Dolan, Peasgood, & White,

2008; Hagerty, et al., 2001; Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004; Noll, 2004; Sirgy, Michalos, Ferriss, Easterlin, Patrick, & Pavot, 2006) or the literatures on well-being and happiness (Diener, 2000; Diener, Oishi, & Lucas, 2002; Diener, Suh, Lucas, & Smith, 1999; Lyubomirsky, King, & Diener, 2005; Ryan & Deci, 2001)? How would one go about conceptualizing and measuring quality of life in a virtual world? What is the relationship of QOVL to QOL?

To provide a context for addressing these questions, this chapter begins with an overview of virtual worlds and people's motivations for using them. As Second Life is currently the dominant example of a fully realized virtual world, many of our examples are based upon Second Life, but our discussion is relevant to all virtual worlds. We then examine the social indicators literature (largely the domain of economics, public policy and sociology) and the well-being literature (largely the domain of psychology), and identify key definitional, theoretical, and measurement issues that are relevant to building a conceptual model of QOVL. In our final section we examine the role of QOVL in the domain of transformative consumer research, and set forth a research agenda for the study of QOVL.

## **2. Virtual Worlds**

### **2.1 Background**

Most generally speaking, virtual worlds are computer-based simulations inhabited by human-controlled avatars. Virtual worlds have been defined as “a synchronous, persistent network of people, represented as avatars, facilitated by networked computers” (Bell, 2008), or as “a computer-generated display that allows or compels the user (or users) to have a sense of

being present in an environment other than the one they are actually in, and to interact with that environment” (Schroeder, 1996, p. 25). Virtual worlds share six characteristics – they are: (1) persistent (2) shared spaces with a (3) graphical 2D or 3D user interface involving (4) interactivity in a (5) social context that (6) is experienced by the user. Each of these characteristics is best viewed as a continuum. For example, social context is a continuum ranging from solitary worlds where the only interaction is between the creator of the world and the visitor, to complex social environments where tens of thousands of individuals may be simultaneously engaged with the virtual world. Similarly, immersiveness of experience, or the degree of presence or telepresence (Steuer, 1992), is a continuum defined by the extent of interactivity and vividness of the virtual environment.

Virtual worlds bear some similarities to massively multiplayer online roleplaying games (MMPORGs) such as World of Warcraft or EverQuest, and to some degree MMPORGs share the six characteristics of virtual worlds. However, as noted by Schroeder (2008), while MMPORGs can be used for social purposes, online games are designed with specific rules and objectives centered around activities such as accumulating points, reaching new levels and completing specified missions, while virtual worlds have been explicitly designed for the purpose of social activity where users are “asked to make it all up for themselves” (Damer, 2008). In reality, the dividing line between MMPORGs and virtual worlds as defined by Schroeder is not so clear cut. The Sims Online (TSO) straddles the border between game and social world, in that users are constrained by gaming rules and must follow a prescribed process to acquire skills and virtual game money, yet at the same time social interaction through live chat is a parallel but unconstrained activity that for many dominates the game. Despite the explicit rules of the game that users follow in The Sims Online or MMPORGs, there are always those

whose main objective in virtual life is “to find new and exciting ways to disrupt the normal course of gameplay” (Ludlow & Wallace, 2007, p. 93). Such “griefers” bend the rules wherever possible to create consequences unanticipated and largely unenforceable by the game designers, such as harassment of new users. Whenever social interaction is possible in an MMPORG, gameplay will evolve in both positive and negative ways beyond the boundaries prescribed by the formal rules of the game.

The number of virtual world platforms is steadily increasing. Spence (2008) surveys 112 distinct virtual worlds, and it is estimated that 900 virtual worlds will be in existence by 2012 (Kzero, 2009). These numbers are deceptively low, in that an individual virtual world can be viewed as a platform supporting multiple distinct environments targeted to different user segments. For example, Second Life alone has over 27,000 distinct regions (Linden, 2009), with widely different environments including commercial, entertainment, social, educational, fantasy, and adult themes, and Blue Mars is built on a business model whereby “City Developers” lease large self-contained autonomous virtual spaces, creating multiple integrated virtual worlds supported by a common platform.

Some virtual worlds have a niche orientation. Club Penguin targets children 6 to 10 with the parental promise that children’s interactions will be in a completely safe online environment. Other worlds, for example Multiverse Places and Kaneva target adults, but with a singular focus on social interaction. Still other “mirror worlds,” such as Twinity and Amazing Worlds, specialize in recreating real life locations such as the city of Berlin in virtual form. Next generation virtual worlds, such as Blue Mars, require computers with the latest powerful graphics hardware but provide extremely realistic avatars, three dimensional immersive environments, and very large numbers of concurrent users. The most broadly based virtual

worlds, of which Second Life is the most fully realized current example, allow users to create, explore, entertain, learn, and socialize against the background of a virtual world economy that is integrated with the real world economy. In such worlds, virtual currency can be exchanged for real-world currencies using Web based currency exchanges. Such a virtual economy in Second Life based upon the “Linden dollar” enabled 61,000 users in October 2008 to maintain a positive cash flow, actually earning income in Second Life. Of these users, 211 earned virtual currency equivalent to at least \$5,000 US Dollars/month primarily through selling virtual goods or virtual real estate. Since at the time there were 16 million Second Life accounts, of which one million used Second Life in October 2008, the odds of striking it rich may sound no better than a Ponzi scheme. Most Second Life users, however, do not use Second Life with the expectation of earning real-world wages. Basic but functional virtual clothing, homes, furniture and pets can be obtained for free, and one can outfit their avatar in the latest designer fashions and hairstyles for considerably less than the price of a night out at the movies in the real world. The extremely low cost of virtual life, in fact, is one characteristic not well understood by real world companies that did enter Second Life with the explicit objective of striking it rich.

Considerable attention was paid in the business and popular press to the activities of real world companies in Second Life during the period from 2006-2007. *Business Week* noted that over 200 companies were experimenting in Second Life in 2006 (Hof R. D., 2006a), and it was difficult to open a newspaper or magazine at that time without reading about something some company was doing in Second Life. However, by 2008 the list of companies that exited Second Life vastly exceeded those that still remained, a reversal of fortunes also noted by the popular press (Rose, 2007). In retrospect, the presence of real world companies in Second Life, while capturing the attention of the popular media, was relatively unnoticed among Second Life users

who found the virtual storefronts set up by firms like Armani, BMW, Toyota, and CocaCola to be significantly less interesting than competing user generated content, which dominated the corporate content in both quality and quantity. One could say that the corporate content created by design firms such as Electric Sheep, Millions of Us, and Rivers Run Red at substantial expense to their corporate clients did little to contribute to quality of virtual life.

## **2.2 Virtual World User Behaviors and Motivations**

**Behaviors.** Human behavior defines the intersection of the real world with virtual worlds. At this intersection, numerous researchers have written about the paradox of parallels and contradictions between real and virtual world behavior. Are the real person and his or her avatar equivalent one and the same? In marketing, there is increasing recognition of the avatar as an independent character, distinct from but related to the consumer's real-life persona (Whang & Chang, 2004). Hemp (2006) argues that marketers need to consider the two-way dynamics internal to the dyad of a real-world consumer and their own virtual avatar; for example, the real-world consumer can purchase virtual goods for the avatar, while the avatar can purchase real-world goods for its physical creator. But, how closely are the real world person and his or her avatar linked together?

Empirical research addresses this question from a variety of perspectives. Virtual world behavior of avatars has been found to mirror real world behavior, to influence real world behavior, and to be influenced by real world behavior. Further, within virtual worlds, characteristics of one's avatar have been found to influence behavior in the virtual world.

We first consider research from a social perception perspective that shows avatar behavior mirrors real world behavior. Similar in spirit to the “media equation” stream of research (Reeves & Nass, 2002) which is grounded in the proposition that people interact with computers and other new media in similar ways that they interact with real people, a growing stream of research has uncovered parallels between virtual world and real world social behaviors. In a replication of the classic Milgran (1963) obedience study, Slater et al (2006) constructed an immersive virtual environment in which participants were required to administer virtual electric shocks to virtual humans and found that “humans tend to respond realistically at subjective, physiological, and behavioral levels in interaction with virtual characters notwithstanding their cognitive certainty that they are not real”. A study of interpersonal distance (IPD) conducted in the virtual world Second Life (Yee N. , Bailenson, Urbanek, Chang, & Merget, 2007) found that norms for IPD from the physical world were carried forward to the virtual world, specifically that 1) male-male avatar dyads exhibit larger IPD than female-female dyads, 2) male-male avatar dyads maintain less virtual eye contact, and 3) decreases in IPD in virtual worlds are met with increased gaze avoidance. Additional evidence that social cues operate similarly in both virtual and real worlds was reported by Eastwick and Gardner (2008) who used the virtual world There.com to replicate real-world findings for the door-in-the-face (DITF) technique, in which an unreasonably large request that is expected to be rejected is followed by a moderate request, and the foot-in-the door (FITD) technique, in which a small request is followed by a moderate request. Both techniques increased compliance of the moderate requests using avatar experimenters and avatar subjects in the virtual world.

In other social contexts the avatar as virtual representation of the self has been found to affect one’s subsequent real life behavior. In addition to finding that participants who were

given taller avatars were more aggressive negotiators in a virtual environment than participants who were given shorter avatars, Yee and Bailenson (2007) found that those participants who had been given taller avatars were also more aggressive negotiators in subsequent real world face-to-face interactions than participants who had been given shorter avatars. Fox and Bailenson (in press) found real-world behavior can be influenced by observation of one's own avatar's behavior. They report that participants who watched their own avatar run on a virtual treadmill voluntarily exercised more themselves the next day, as compared to participants who watched their avatar standing still, or who watched a stranger's avatar on a treadmill. We also note that interactions occurring in a virtual environment itself may impact real world behavior in positive ways. McKenna, Green and Gleason (2002) found that participants who met each other for the first time through online chat liked each other more based upon that interaction than did participants who met face-to-face for the first time. Even in a subsequent face-to-face meeting when those who met online finally met face-to-face, they continued to like each other more than did participants who first met face-to-face and continued to meet face-to-face.

On the other hand, real world personal characteristics and behaviors can, in turn, influence the choice of virtual world characteristics and behaviors. Dean, Cook, Keating and Murphy (2009) found that individuals who engage in physical activities in real life also engage in virtual physical activities in Second Life, and that individuals who are thinner in real life have thinner avatars. Similarly, Messinger et al (2008) found that Second Life users tend to customize their avatars so they resemble their real selves, but with moderate enhancements, and that Second Life users behave in similar ways to real life, although their virtual world behavior is somewhat less restrained by inhibitions.

Last, there is evidence that the avatar representation of the self affects behavior in virtual environments. As noted, participants with taller avatars are more aggressive negotiators within a virtual world (Yee & Bailenson, 2007). Individuals whose avatars are more attractive than their real self have been found to behave in a more extraverted manner in virtual worlds, especially when the person is low on extraversion in real life (Messinger, Ge, Stroulia, Lyons, Smirnov, & Bone, 2008). Recent research has found that consumers embodied in an avatar that resembles the typical user of a product have more favorable brand attitudes and greater purchase intention (Yang & Chattopadhyay, 2009). The virtual environment itself also impacts how people view themselves in the virtual setting. Due to anonymity and reduced cost for self-disclosure, individuals interacting through online chat are better able to express their true self (Rogers, 1951) than individuals in face-to-face interaction (Bargh, McKenna, & Fitzsimons, 2002).

**Motivations.** Even more fundamental than user behavior are the motivations people have for participating in virtual worlds. Why do people use virtual worlds in the first place? Why do they continue using them? Understanding why people use virtual worlds is essential for considering the quality of virtual life in such world, since motivations identify broad domains in virtual worlds that are important to different people, within which quality of virtual life can be separately assessed.

Based upon a 40 item inventory administered to over 3,000 MMPORG players, Yee (2007) identified three higher order components specifying user motivations to play in massively multiplayer online games: achievement, social and immersion. Each of the three higher order components is, in turn, specified by a number of sub-components. Achievement consists of advancement (progress, power, status), mechanics (game related numbers, optimization, templating), and competition (challenging others, provocation, domination). Social includes

socializing (chat, helping other, making friends), relationship (personal, self-disclosure, provide support) and teamwork (collaboration, groups). Immersion includes discovery (exploration, lore, finding hidden things), role-playing (story line, roles, fantasy), customization (appearances, accessories, style) and escapism (relax, avoid real-live problems). These motivational components also largely apply to virtual worlds, although motivations related to game-specific aspects would be reduced in importance, for example advancement through progression of pre-specified game or character levels. We next briefly review other research that has investigated these three broad motivational constructs in the context of social media.

The immersion dimension is particularly important for virtual worlds and other forms of social media such as online communities, blogs, microblogs, wikis, online chat, and video sharing sites. Virtual worlds, like social media in general and the Web as a whole, incorporate both goal directed and experiential user activities. Flow, aesthetic enjoyment, immersion and escape have identified as motivating factors for use of a wide range of social media (Barnes, 2007; Hoffman & Novak, 1996) for both goal-directed activities such as education, research, and information search (Barnes, 2007; Java, Finin, Song, & Tseng, 2007; Lenhart & Fox, 2006; Ridings & Gefen, 2004; Trammell, Tarkowski, Hofmohl, & Sapp, 2006; Weiss, Lurie, & Macinnis, 2008) as well as experiential activities involving fun, relaxation and enjoyment (Barnes, 2007; Cho, 2007; Jung, Youn, & McClung, 2007; Nov, 2007; Ridings & Gefen, 2004; Stoeckl, Rohmmer, & Hess, 2007; Trammell, Tarkowski, Hofmohl, & Sapp, 2006).

Social motivations identified in social media include altruism, social interaction, communication, development of social capital, and relationships (Barnes, 2007; Butler, Sproull, Kiesler, & Kraut; Cho, 2007; Daugherty, Eastin, & Bright, 2008; Java, Finin, Song, & Tseng, 2007; Jung, Youn, & McClung, 2007; Lenhart & Fox, 2006; Trammell, Tarkowski, Hofmohl, &

Sapp, 2006; Weiss, Lurie, & Macinnis, 2008; Ridings & Gefen, 2004). Achievement motivations for social media have been found to involve esteem needs, self-validation, reputation development, external economic incentives and professional advancement (Barnes, 2007; Cook, 2008; Jung, Youn, & McClung, 2007; Kuznetsov, 2006; Li & Bernoff, 2008; Stoeckl, Rohmmer, & Hess, 2007; Trammell, Tarkowski, Hofmohl, & Sapp, 2006).

Judged by the wide range of corroborating evidence, Yee's framework provides a useful starting point for understanding the reasons people choose to use virtual worlds. However, there are a few constructs not included in this framework that are relevant for understanding why people use virtual worlds. Social media use has related to the construct of eudaimonic well-being (Ryan & Deci, 2001) which views well-being as realizing one's true nature. For example, Miura and Yamashita (2007) find that blog writing, for example, allows some writers to deepen their understanding of their self. Barnes (2007) similarly notes that virtual worlds enable the extension of self in a manner that facilitates fulfillment of Maslow's highest order self-actualization need. Self-expression and the creative impulse have been found to motivate social media use. In social media as diverse as Twitter, virtual worlds, online chat, blogs and Facebook, self-expression is an important motivation (Barnes, 2007; Daugherty, Eastin, & Bright, 2008; Java, Finin, Song, & Tseng, 2007; Jung, Youn, & McClung, 2007; Lenhart & Fox, 2006; Li & Bernoff, 2008; Miura & Yamashita, 2007; Zhao, Grasmuck, & Martin, 2008).

Last, the desire for control motivates much social media use and takes a range of forms. Those who are motivated to use social media for the control it affords includes those people attracted to the ability to outsource their memory and achieve lasting access to information (Schotz, 2008), those who use social media for utilitarian purposes and practical solutions (Daugherty, Eastin, & Bright, 2008; Cook, 2008), and those who seek safety through anonymity

(Barnes, 2007). Virtual worlds, by providing an alternative reality offering a new beginning with its own social structure, aesthetic landscape and economy, also provide a sense of control to those individuals who may not be satisfied with their day to day reality.

Based upon the above discussion, five broad motivational constructs are important for understanding why people use virtual worlds: social, immersion, achievement, self-expression, and control motivations. We next turn to consideration of the construct of Quality of Virtual Life (QOVL).

### **3. Quality of Virtual Life**

People spend significant amounts of time in virtual worlds. Various research studies have found that users spend on average from 20 hours/week (Castronova, 2001) to 22 hours/week (Reperes, 2007) with the heaviest concentration of time occurring on weekends (Fetscherin & Lattemann, 2007). The Reperes study of Second Life found the “expert users” consisting of 7% of the sample spent on average over 37 hours/week in Second Life. For many people, time spent in virtual worlds is equivalent to a half time job. For some, it is equivalent to a full time job. For some with a full time real world job, time spent in Second Life is a significant portion of their work week. Employees of Linden Lab, the company that operates Second Life, spend on average eight hours of work time per week in Second Life (Linden G. , 2009). Many people are living a virtual life. How do they like it?

A recent large scale study of 2094 Second Life users by Bell, Castronova and Wagner (2009a) included items measuring both satisfaction with real life and Second Life. Satisfaction was measured on an 11 point scale, with 0=completely dissatisfied and 10=completely satisfied.

Second Life satisfaction (mean=7.57) was slightly higher than real life satisfaction (mean =7.25), and both Second Life and real life satisfaction were positively correlated with hours spent in Second Life (2009b).

We may conclude that for at least some people, virtual worlds play a significant enough role in their lives to warrant consideration of the quality of virtual life (QOVL). Within Second Life, users seem to be at least as satisfied with their virtual life as they are with their real life, and the level of satisfaction increases with time spent in the virtual world.

As for whether it really makes sense to consider quality of life for virtual worlds, consider that quality of life has been studied from a wide range of perspectives, such as sociological, economic, psychological, marketing, health, and occupational (Sirgy, Michalos, Ferriss, Easterlin, Patrick, & Pavot, 2006). Perhaps the strongest parallel is with quality of work life (QWL). Many of the questions that have been investigated about QWL (Sirgy, Michalos, Ferriss, Easterlin, Patrick, & Pavot, 2006, p. 425) can be directly translated to QOVL (simply substitute QOVL for QWL): “Does QWL contribute significantly to QOL? How does quality of work life contribute to overall QOL? What are other consequences of QWL? What are some factors affecting QWL? How to deploy/QWL programs?”

Also relevant to our discussion of QOVL is the central role of the avatar in virtual worlds. As noted earlier, behavior in virtual worlds can mirror the real world, but in addition, the virtual and real self can influence each other. To the degree that the avatar is separable from the self, one can visit a virtual world as a person with very different physical and behavioral characteristics than one’s real world self. However, even if the avatar is a reasonably true representation of the real world self, the virtual environment is likely to significantly differ from

the real world environment. Thus, QOVL can diverge from real world QOL for two distinct reasons – because of differences between self and avatar, and because of differences between the real world and the virtual world.

An additional consideration is the type of virtual world for which QOVL is most relevant. In our brief discussion of virtual worlds, we considered broadly based worlds like Second Life, which provide an immersive social context, a functioning economy (in this case, with a currency more stable than the US dollar), a compelling visual environment that allows the user to suspend disbelief, and which allows each user to create content and maintain the intellectual property rights of that content within the virtual world. Such broadly based worlds provide the largest base of domains in which QOVL can be assessed, although QOVL can apply in a restricted manner to more limited worlds, for example those lacking an economic dimension, or those that do not provide ways for users to generate content .

In the next sections, we briefly consider some key insights from the quality of life and subjective well being literatures, and apply these to build a conceptual model of QOVL. Rather than create a definitive framework for understanding QOVL, our objective is to lay out a range of reasonable components of such a model, and then set forth an agenda for future research.

### **3.1. Lessons from Quality of Life and Subjective Well Being**

Quality of Life (QOL) and Subjective Well Being (SWB) both have vast literatures and an exhaustive review is not realistic or attempted as excellent reviews are available (Diener, Suh, Lucas, & Smith, 1999; Hagerty, et al., 2001; Lyubomirsky, King, & Diener, 2005; Ryan & Deci, 2001; Sirgy, Michalos, Ferriss, Easterlin, Patrick, & Pavot, 2006). As noted earlier, QOL is largely the domain of the social indicators literature, with an economic and public policy focus,

while SWB is largely the domain of the psychology literature, with an emphasis on the processes underling SWB.

Social indicators consist of both subjective and objective indicators. As noted by Michalos in his discussion of conceptual foundations of QOL (Sirgy, Michalos, Ferriss, Easterlin, Patrick, & Pavot, 2006), social indicators are sometimes equated with objective indicators, and quality of life indicators are sometimes equated with subjective indicators. Subjective indicators overlap to some degree with measures of subjective well being, and are individuals' evaluations of their satisfaction, attitudes and beliefs. Objective indicators are readily measured by observation and may be obtainable at the aggregate rather than individual level.

As noted by Noll (2004, p. 154), "social indicators are regarded as instruments for the regular observation and analysis of social change." Given the dynamic evolution of virtual worlds, detection of such social change is particularly important to observe in a timely manner. Traditionally, objective social indicators at the national level have included constructs such as income, employment, divorce rate, productivity, and crime rates. For virtual worlds, while analogies of these physical world indicators can certainly be obtained, other measures are relevant as well and are readily available on essentially a real-time basis for some virtual world platforms in the form of publicly available economic statistics. For example, Second Life provides raw data files on a daily basis for a set of statistics on its virtual economy including acres auctioned, land for sale, logged in users, respondent transactions, Linden dollar money supply, virtual business profits, and consumer spending<sup>1</sup>.

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<sup>1</sup> Economic Statistics (Raw Data Files), <http://secondlife.com/statistics/economy-data.php>

In addition, objective data of user interest in virtual worlds is obtainable through tools such as Google Insights for Search<sup>2</sup>. Google Insights for Search provides downloadable weekly data for up to the past five years on search volume for any keyword phrase one enters, for example “virtual worlds,” “Second Life,” or “Linden Dollar.” These search volume trends can be filtered by geographic region or category context (e.g. business, computers, entertainment). Search volume trends from Google Insights for Search have been successfully used to predict retail sales in the automobile, housing, and travel categories (Choi & Varian, 2009). Search trends for keywords related to virtual worlds would similarly be expected to be predictive of interest and trial of virtual world platforms, word of mouth activity, and other social indicators related to QOVL. While search volume trends represent the interest of a broader population than the user base of a virtual world, this expression of broader interest is in itself an important objective indicator.

The discussion by Pavot of QOL research from a psychological perspective (Sirgy, Michalos, Ferriss, Easterlin, Patrick, & Pavot, 2006) provides a concise overview of a number of key issues in SWB. SWB research generally follows the “hedonic view” in which maximization of pleasure leads to happiness, as opposed to the “eudemonic view” in which well-being is distinct from happiness and is derived from the striving to realize one’s true potential (Ryan & Deci, 2001). In the hedonic view, SWB consists of three relatively independent constructs – positive affect, negative affect, and a cognitive component operationalized as satisfaction judgments. Thus, the measure of virtual world satisfaction mentioned early that was used by Bell, Castronova and Wagner (2009b) represents only one of three distinct components of SWB. SWB, in fact, has been defined even more broadly, with Diener, Suh, Lucas and Smith (1999)

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<sup>2</sup> Google Insights for Search, <http://www.google.com/insights/search/#>

considering SWB a broad research area rather than a distinct construct. While it represents a simplification that some may be uncomfortable with, for purposes of simplicity we consider SWB as a component of a broader QOL domain, consisting of subjective measures of quality of life.

Drawing from the combined literatures of QOL and SWB, we highlight below a series of issues which are relevant for developing a framework for understanding QOVL. These include measurement, choice of domains, methodology, and framework development.

**Measurement.** Hagerty et al. (2001, pp. 2-11) present and apply a list of 14 criteria for evaluating QOL indices. Several relate to measurement issues. They specify that a QOL index should be reportable as a single number, but should also be decomposable into components, where the components are reliable, valid, and sensitive to change in public policy or market input. The components of the index should be based upon time series data. Seven distinct QOL domains are recommended, with the recognition that these can be supplemented for particular populations or applications: relationships with family and friends, emotional well being, material well being, health, work and productive activity, feeling part of one's local community, and personal safety. Within each domain, multi-item rather than single-item measures should be used (Sirgy, Michalos, Ferriss, Easterlin, Patrick, & Pavot, 2006; Diener, Oishi, & Lucas, 2002).

**Choice of Domains.** As the domains used for QOVL will differ from QOL, the criteria for selecting domains are important (Hagerty, et al., 2001). Again, from the list of criteria provided by Hagerty et al., the components should represent domains which together represent the total of life experience (or virtual life experience), with each domain representing a substantial but separate part of the QOVL construct. The domains should not be idiosyncratic, but each domain

must be relevant for most virtual world users. There should be both objective and subjective indicators for each domain. If an additional domain is included beyond a certain base set of “default” domains, it must be empirically shown to contribute incremental variance to the QOVL construct above and beyond the base set. Last, the domains should have both cognitive (satisfaction) and affective (positive and negative) components.

**Methodology.** As specified by the requirement that QOVL indices be based upon time series data, longitudinal designs for subjective measures will be required. Self-reports of subjective indicators are problematic in that they may be influenced by momentary fluctuations in mood (Diener, Oishi, & Lucas, 2002). Experience Sampling Methodology (ESM), which involves the random sampling of subjective measures over a period of time, can be used to address such problems with self-report measures (Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004). When aggregating across domains to obtain an overall index of QOVL, the domains should be weighted by importance to the individual (Diener, Oishi, & Lucas, 2002).

**Framework Development.** A QOVL index should be grounded in established theory, which is operationalized as set of concepts and structural connections between quality of life and its domains, antecedents, and consequences. For example, Hagerty et al. (2001) specify a systems theory structure identifying input, throughput, and output components. In their framework, input components consist of exogenous environmental variables and chronic individual characteristics that impact QOL. Throughput components describe how the individual responds to the environmental variables. These responses are viewed as reflecting choices people make within specific domains. Measures of subjective well being reside in this framework as an output component.

### 3.2. Toward a Model of Quality of Virtual Life

In this section, we present a conceptual framework for QOVL that extends the systems theory structure of Quality of Life developed by Hagerty et al. (2001). Figure 1 presents our conceptual framework. The right side of the conceptual framework is directly drawn from Hagerty et al. (2001) and was first suggested by Veenhoven (1998) and Cummins, et al. (1998). As the right side of Figure 1 has been explained in detail elsewhere (Hagerty, et al., 2001, pp. 79-80), we focus on the left side.

--- Insert Figure 1 about here ---

QOVL consists of a range of constructs organized in a structural framework. At the far left, the first column contains input variables consisting of either structural or performance criteria of a virtual world platform. The structural criteria are the assessment of a specific virtual world on the six characteristics that define virtual worlds, persistence, shared space, interface, interactivity, social environment and immersive experience. Assessment of the structural criteria requires both objective and subjective indicators. For example, while specific features of the interface can be objectively described, perceptions of interface usability would be determined via survey research or expert judgment. The structural criteria identify strengths and weaknesses of a specific virtual world. As virtual worlds are constantly under development by both the creators and users of the virtual world, structural criteria must be re-assessed at regular intervals.

Also in the first column are performance criteria. These are aggregate objective indicators of the performance of the virtual world on a range of criteria. As noted earlier, Second Life publishes a set of performance criteria on a daily basis, accessible to the general public. Number of users is a key objective criteria, which can be measured at a variety of levels, for example total

registered accounts, number who have visited the virtual world at least once in a specific time period (past month, past week), and the number who regularly visited the virtual world in a specific time period. The number of concurrent users is also an important metric, as the number of users simultaneously visiting the virtual world at a given point in time is an indicator of the depth of social interaction possible. In addition, concurrent users can be measured at both global and local levels. In Second Life, while globally over 70,000 users may be logged on simultaneously, in any given local simulator region the number of concurrent users is much smaller, with a maximum of 100 avatars per region. The region is the basic unit of land in Second Life, with virtual dimensions scaled to represent a 256 by 256 meter square plot of land. Actual numbers of concurrent local users in a region do not come close to the maximum, as 45% of regions are completely empty and only 2% of regions have more than 20 avatars (Varvello, Picconi, Diot, & Biersack, 2008).

As mentioned previously, interest in virtual worlds can be objectively measured using time series data of search volume for specific search queries. The abandonment rate for a virtual world can be calculated as the percentage of new signups who enter the world for the first time at time one, but who never return to the virtual world after time two. There are multiple potential explanations for a high abandonment rate. Ease of use could be poor, people may be trying and discarding alternate avatars, or users may be dissatisfied with the experience.

Additional objective performance criteria include the total amount of available virtual territory, which can increase as server space is added, the amount of virtual territory changing ownership, transactions, virtual money supply and virtual profits. Somewhat more difficult to assess is the total amount of user generated content (UGC) in a virtual world. Unlike a blog or social networking site where it is possible to obtain objective counts of the number of discussion

posts and comments, counting virtual objects is a bit more challenging, although various approaches are possible. In Second Life, each region is limited to a maximum of 15,000 prims, the basic building unit out of which all other objects are created. One can determine, for each region, the number of prims currently in use, and this can serve as an index of the amount of UGC in that region. Another example of an index of UGC in Second Life would be the number of virtual items offered for sale at central venues such as the Xstreet marketplace, a Web based shop for selling virtual goods that is integrated with Second Life<sup>3</sup>.

The second column contains throughput variables, which “describe the individual’s response to the environment” (Hagerty, et al., 2001, p. 79). These are individual level variables reflecting choices people make as they use a virtual world. The throughput variables listed in Figure 1 are both objective and subjective. It is at least theoretically possible to obtain objective data (counts) on an individual’s number of friends, the number of groups they have joined, the number and value of transactions, and time spent in a virtual world. However, self-report, and thus necessarily subjective data, must generally be obtained on the type of activities engaged in, locations visited, number of alternative identities, and people’s goals or objectives for using a virtual world. Avatar appearance can be assessed by expert judges or by the user, and has both objective and subjective components.

In the third column are five domains in which virtual world SWB can be assessed. These represent the five main motivations for using virtual worlds, from our previous discussion: social, achievement, immersion, control, and self-expression. Note that these domains diverge significantly from the domains used to assess SWB in the real world. In the real world, there are clear norms and institutions for unambiguously defining family, friends, work, and community.

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<sup>3</sup> Xstreet Second Life marketplace: <http://xstreet.com>

The meaning of these terms in virtual worlds is less clear cut. But, the social domain would parallel family, friends and community in the physical world, while the achievement domain would parallel work. Health, material well being, and personal safety are less relevant (but not completely irrelevant) in virtual worlds, and are incorporated in domains for control and achievement. As noted earlier, self-expression is a major motivation for using virtual worlds and while it parallels emotional well-being to some extent, it goes beyond emotional well-being in explaining why people create user generated content.

Within each domain, SWB can be assessed with subjective indicators. At this stage, we are very closely paralleling assessment of SWB in the real world. For each of the five virtual world domains, we can assess both positive and negative affect, as well as satisfaction, and derive an overall index. The arrows at the bottom represent feedback effects of virtual world SWB. Corresponding to Haggerty et al.'s (2001) discussion of the right side of Figure 1 for the feedback effects of SWB in QOL, in virtual worlds, SWB can affect both people's personal choices (i.e. VW throughput) as well as their community choices. Community choice represents a fundamental difference between real and virtual worlds. Unlike the real world, in a virtual world, if you are very dissatisfied you always have the option of abandoning the virtual world and finding another one which you believe will have a better QOVL. This is a choice generally unavailable in the real world and presents an outcome that has considerable business, as well as personal, significance.

Also note that there a number of connections between QOVL and QOL specified in Figure 1. At the broadest level, virtual world SWB and real life SWB can influence each other. While this remains an empirical question, it is possible that people who are happier in real life are also happier in virtual worlds, but also that those who experience happiness in virtual worlds can

become happier in real life. There are also reciprocal causal links between virtual world and real world domains. For example, individuals who have a strong focus on family and friends in the real world may tend to social activities in virtual worlds. Conversely, people who have difficulty interacting with other people in the real world may be able to establish relationships with others in the virtual world, and those relationships may then extend into the real world. Last, for similar reasons, reciprocal links are indicated between individual choices people make in virtual worlds and choices they make in the real world. One non-reciprocal link in Figure 1 is that between the real world input (exogenous) variables and the virtual world input variables. People with certain personality characteristics, from certain social strata, or from specific countries may prefer different types of virtual worlds. However, the reverse is generally logically impossible. Our choice to qualify this as “generally” impossible is due to exceptions to the rule such as Anshe Chung, the avatar of real life Ailin Graef, who accumulated a portfolio of virtual property in Second Life with a market value of one million US Dollars (Hof R. , 2006b), thus impacting her real world socioeconomic status.

With our conceptual framework in mind, we turn to a discussion of a research agenda for QOVL.

#### **4. Transformative Aspects of Virtual Worlds – A Research Agenda for QOVL**

This final section proposes a research agenda that follows from the conceptual framework in Figure 1. Rather than expanding upon the already stated connections established in Figure 1, our discussion here is organized according to a range of ways that virtual worlds may affect well-being. Corresponding to the distinction between QOL/social indicators and SWB/happiness research, the topics we select represent more of a QOL/social indicators focus on policy and

societal issues, rather than a SWB/happiness focus on the underlying processes. This decision is due to our conceptual framework, which orients the research agenda more to a broader QOL focus. The objective is not to specific fairly narrow testable research propositions, but rather to stimulate thinking about virtual worlds and quality of life in new directions.

**Adoption of virtual worlds.** Not everyone believes that virtual worlds will become a mass phenomenon. The Pew *Future of the Internet III* report (Anderson & Rainie, 2008) includes comments from many experts on the evolution of virtual worlds over the next decade. One writer and consultant, Scott Smith, stated that “participation in general metaverses may decline in duration and variety after a short-term peak in usage as users seek to rebalance toward the ‘real’ and authentic and see fewer benefits in being active in metaverses.” (Anderson & Rainie, 2008, p. 94). Joe McCarthy, formerly a principle scientist at Nokia Research Center commented, “I fear that the time and attention consumed in such worlds will come at the expense of actions that might make the offline world a better place” (Anderson & Rainie, 2008, p. 97). Of course, we must put in perspective that some in the 1990s maintained that the Internet itself was a fad.

As the extent to which virtual worlds will be widely adopted as an alternative to physical world activities is not yet clear, quality of life together with broader policy considerations are likely to play a key role in adoption and diffusion. It has been argued that diffusion of innovation goes beyond the its usual portrayal as a communication process involving consumer segments who adopt a new product at different points in time, and should also include public policy and technological infrastructure initiative that may either increase or slow the pace of innovation (Owen, Ntoko, Zhang, & Dong, 2002). An example of such an initiative is the Beijing Cyber Recreation District project (Keegan, 2007), a 100 square kilometer real world site devoted to creating the computing, communications, electrical, financial and logistics

infrastructure that will support a series of “virtual Chinas” (Keating, 2008) each with hundreds of millions of users. Such massive investment has the potential to accelerate the pace of the adoption curve for virtual worlds, but does not by itself guarantee success. An important research question is the role of objective and subjective social indicators in the adoption process for virtual worlds. Which indicators are most predictive of adoption of virtual worlds? What is the role of subjective well-being, as experienced in virtual worlds, in accelerating or dampening the pace of adoption?

One factor that hinders both adoption and QOVL is that different avatar identities are required to experience separate virtual world platforms. Currently, each virtual world is essentially a closed kingdom. One must redefine oneself for each world – Second Life, There.com, Active Worlds, Blue Mars – creating new avatars for each world that have no connection with each other. This is similar to how pre-Web users needed separate accounts to visit AOL, CompuServe, and other such closed networks. A joint project between IBM and Linden Labs seeks to create “universal avatars that can travel between worlds” (BBC News, 2007), but any widespread implementation is unlikely in the near to mid-term. While this creates barriers to adoption, it also raises important research questions about how one should construct a multi-world model of QOVL. Figure 1 extends the QOL model discussed by Hagerty et al. (2001) and suggests world-switching can occur through the feedback link leading away from virtual world SWB. However, many people do concurrently explore multiple virtual worlds, and one important research direction is a QOVL model that takes into account both multiple identities and multiple worlds.

**Virtual consumption as a substitute for physical consumption.** The age old question is, “does money make us happy?” In reviewing relationships between income and SWB, Diener,

Suh, Lucas and Smith (1999) summarized the literature as: 1) wealthier people are happier than poorer people, but the effect is small; 2) SWB increases or decreases with change in income, but because of adaptation the effects are temporary; 3) at the national level, SWB does not relate to changes in economic growth; and 4) the largest effects of income and SWB are between-national differences in GNP and purchasing power, but these differences may be confounded by indirect benefits of wealth, rather than wealth itself. While there is some relatively modest relationship between income and happiness, Lybomirsky, King and Diener (2005) assert that a portion of the association is due to the reverse causal sequence whereby “happy people are likely to acquire favorable life circumstances” (Lyubomirsky, King, & Diener, 2005, p. 803). Thus, happiness leads to success.

Csikszentmihalyi (2000) notes that the level of material consumption, in addition to not correlating with people’s happiness and subjective well-being, is neither sustainable nor scalable to the world’s population and raises the question: “Is it impossible to develop an economy...where consumption involves the processing of ideas, symbols, and emotional experiences rather than the breakdown of matter?” (Csikszentmihalyi, 2000, p. 271). We point out that virtual worlds provide such an economy, where virtual currency changes hands as payment for virtual goods or services to be enjoyed in the world, as payment for activities undertaken or services performed in the world, as compensation for creation of virtual content, as losses or winnings in games of chance, or as rental or payment for ownership rights to virtual property (Castronova, 2005). Lin (2008) provides an extensive discussion and documentation of the positive environmental consequences of virtual consumption and argues that virtual worlds can satisfy consumption desires and offer a viable alternative to physical world consumption. However, despite the appealing and almost self-evident argument that virtual consumption is

inherently more environmentally friendly than physical consumption, some have questioned the environmental sustainability of virtual consumption. By calculating the power consumption required to support Second Life users' personal computers, Linden Lab servers, and data-center cooling requirement, per capita power consumption to annually support a single Second Life avatar is 1,752 kWh/year, which is only slightly less than the electricity consumed by the average citizen of Brazil (1,884 kWh) and substantially more than the per-capita consumption in developing countries (1,015 kWh), so while avatars "don't have bodies...they do leave footprints" (Carr, 2006).

A number of research questions follow from this discussion. To what extent can real world consumption activities that contribute to quality of life be replaced by virtual consumption activities? Does virtual consumption have a stronger correlation with subjective well-being than material consumption? Does experience with virtual consumption reduce the desire for material consumption?

**Virtual presence as a substitute for physical presence.** There are clear cost efficiencies to holding events virtually rather than physically. Jim O'Neill, author of the Infotoday blog, commented that a shift from real to virtual meetings "will happen on the basis of economics and any forthcoming fuel shortages. It is easier (and far less costly in terms of time and money) to have people interact in a virtual world rather than have them traipse around the world" (Anderson & Rainie, 2008, p. 86). The lack of regulation and greatly simplified logistics in virtual environments also increases the attraction of the virtual option. Technology author Fred Hapgood commented that when "you want to throw a rock concert online you don't have to post bonds, buy insurance, rent portable toilets, and so on" (Anderson & Rainie, 2008, p. 86).

Beyond these rather practical considerations, presence as defined as the sense of being immersed “in” in a virtual environment has been studied for many decades in the context of virtual reality (Steuer, 1992; Schuemie, van der Straaten, Krijn, & van der Mast, 2001). While some attention has to been paid to specific consequences of presence in virtual environments, for example aggression in video games (Nowak, Kremer, & Farrar, 2008), the causal direction of the relationship of presence to emotional responses is unclear (Schuemie, van der Straaten, Krijn, & van der Mast, 2001). Considerably greater attention has been paid to the measurement of the experience of presence itself, in that presence is a key outcome measure in the design of virtual environments, and has been found to relate to the broader construct of flow in online environments (Csikszentmihalyi, 1997; Hoffman & Novak, 1996; Hoffman & Novak, 2009). Flow is an outcome measure that does have significant impact on learning, exploratory behavior, purchase intentions/behavior, and usage (Hoffman & Novak, 2009).

In terms of quality of life, a number of important research topics center around presence. One would expect that presence in virtual worlds correlates with measures of virtual SWB, but this needs to be verified, and causal relationships determined, including the role of individual differences in the ability to experience presence in virtual worlds with SWB measures. One of the virtual world domains listed in Figure 1, immersion, specifically relates to the construct of presence, but to what extent does presence correlate with SWB measures with all five domains? What leads to presence in virtual worlds? To what extent is presence due to individual choices within a virtual world (time spent, avatar customization, consumption activities, friend, etc.) vs. structural characteristics of the virtual world environment?

**Virtual worlds as intervention.** Diener, Oishi and Lucas (1999) discuss a number of intervention programs designed to impact subjective well being. Interventions that have

increased subjective well being include teaching people how to imitate traits of happy people (Fordyce, 1983), kindness interventions (Otake, Shimai, Tanaka-Matsumi, Otsui, & Kredrickson, 2006), gratitude interventions (Emmons & McCullough, 2003), and interventions based upon writing tasks (Lyubomirsky, Sousa, L, & Dickerhoof, 2006). In his summary of prior research on how quality of work life can contribute to overall quality of life, Sirgy (Sirgy, Michalos, Ferriss, Easterlin, Patrick, & Pavot, 2006, p. 426) notes that affect experienced in the work domain can influence affect experienced on other life domains.

There is evidence that virtual worlds can serve as an intervention to increase SWB. In a study of gay and lesbian individuals who experienced negative effects in the real world due to their sexual orientations, Cabiria (2008) concluded that virtual worlds can “provide the means to lead a more authentic life” and that positive experience in Second Life spills over into the real world. A recent survey of health related activities in Second Life uncovered 68 projects that were related to health care, including Second Life projects dealing with autism, Asperger’s and substance abuse treatment, and concluded that “simulations that teach users about a specific topic can leave a lasting impact that transfers to the real world” (Beard, Wilson, Morra, & Keelan, 2009).

Virtual worlds as intervention for improving real-world QOL is a research topic with significant policy implications. To what extent can virtual worlds improve real life SWB, what degree of immersion in virtual worlds is required, how long do the effects last, and for which types of individuals is such intervention most likely to be successful? When the real world environment is less than optimal, can the virtual world environment compensate in specific real world domains? How should virtual world intervention programs for impacting real world QOL/SWB be designed and evaluated?

**A new digital divide?** One broad policy and societal concern is the potential for a new digital divide (Hoffman & Novak, 1998) between those with and without access to virtual worlds. As noted in the Pew *Future of the Internet III* report, “virtual worlds currently have a generational divide, with younger people readily moving into the world of the scenario, while older people generally do not participate” (Anderson & Rainie, 2008, p. 95). If virtual worlds can enhance real life QOL, then those without access lack this opportunity. While this is perhaps the most obvious divide between virtual haves and have nots, there is also the concern of a digital divide within virtual worlds themselves, for example between insiders who belong to a subgroup within the virtual world and outsiders who do not (Axelsson, 2002). In *Second Life*, there is a definite stigma associated with being a new unsocialized new user or “newbie” (Boostrom, 2008), to the extent that “when a place is filled with a newbies, it is about as bad as if it was empty.” Thus, even if one has access to a virtual world, one does not immediately have access to the social environment within it.

This raises some additional research topics. What are the factors that contribute to people using or not using virtual worlds? What is the critical level of involvement within a virtual world required to have a real impact on quality of life both within the virtual world, and in the real world? Comparing those who have been familiar with virtual world environments since their childhood with those who have recently been introduced to virtual worlds, are there differences in the factors that lead to positive affect and satisfaction with virtual worlds?

**The advent of mixed reality.** Virtual worlds represent a clear dichotomy between the real world and a computer-generated world. At one extreme is a vision of the future where large numbers of people are sequestered in virtual environments for a significant portion of their waking hours. This is not the only scenario. Mixed reality merges the real world and a virtual

world along a “virtuality continuum” ranging from the real world at one extreme to a completely virtual environment at the other extreme (Milgran & Kishino, 1994). At points along this continuum, the real and virtual are mixed together in varying proportions. *Augmented reality* denotes systems in which the real world is dominant, but is enhanced by means of computer generated, primarily visual, displays that overlay information or representations of virtual objects on the real world. On the other hand, in *augmented virtuality* the virtual world is dominant, but aspects of the real environment are present in the virtual world, for example a live camera connection to a live real-world speaker from a virtual world conference attended by avatars. Mixed reality offers prospects for enhancing SWB in conventional QOL domains. For example, virtual interactions with distant loved ones may impact the family and friends domain, and eventual holographic projections of virtual objects into the real world that enhance one’s physical surroundings may impact the material well-being domain. Research questions include the degree to which virtual enhancements or augmentations of the real world impact quality of life in different domains.

In conclusion, virtual worlds are with us today, and are expected to become much more prominent in the coming decade either as alternatives to living in the real world, or as a means of enhancing real world conditions. In the coming decade, QOVL is expected to become an important consideration for a segment of society that will spend significant amounts of time in virtual worlds. Significant corporate and government investment in virtual worlds will justify collecting and reporting QOVL performance metrics, and a wealth of research issues discussed in this chapter present themselves regarding the measurement of QOVL and its impact on real world QOL.

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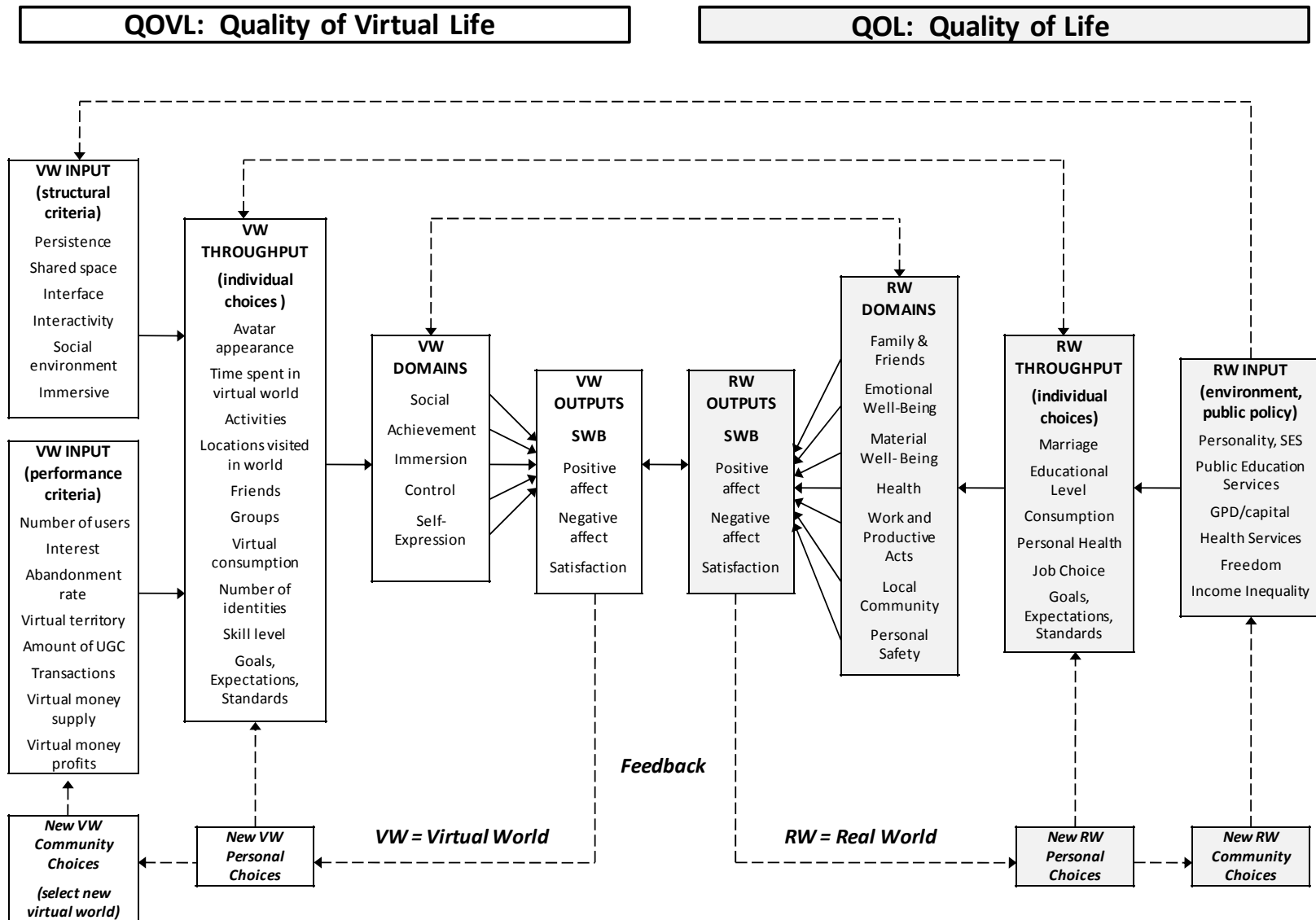


Figure 1. Conceptual Framework of Quality of Virtual Life (QOL)