# Creating a Framework for Eliciting Consumer Satisfaction in Second Life

**by**

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## *Abstract*

Using consumer satisfaction as an example of complex communication and a virtual world as a mediating platform, a novel framework for eliciting consumer satisfaction has been developed. Consumer satisfaction is a key element for business success, while the elicitation of satisfaction perceptions from consumers can help vendors to assess and to improve their business performance.

The objectives here are: how consumer satisfaction is defined, understood and measured; how virtual worlds function, both as a platform and a product; how users typically perceive their experiences in virtual worlds; and how consumer satisfaction metrics can be translated into a virtual environment. Second Life is used as an enabling technology for gathering requirements as well as for the construction, refinement and validation of the framework. Second Life is a virtual world, a multi-user, 3D, immersive environment, which has its own internal economy. The choice of using this social virtual world was due to Second Life being a resilient and widely used platform.

The main contribution of this thesis is a framework that can be used to identify and categorise the complex and inter-related factors that affect the use of Second Life in terms of consumer satisfaction perceptions. Another contribution here is a novel approach to Search Engine trend analysis, which focuses on the number or search results returned as opposed to the number of queries for a given search phrase.

Based on the research conducted by the author and knowledge gained from the literature, a framework has been developed which identifies interrelated components that provide a wider context to perceive the user experience of Second Life. The approach taken by the framework enables it to be used as a means to comprehend Second Life both as a product and as a platform. A Straussian Grounded Theory approach was taken to data gathering, analysis and interpretation in the context of the framework; further refinements are made to the framework as a consequence of emergent themes revealed through the process of analysing the gathered data. Guidance is given in brief as to how the framework can be adapted to reveal consumer satisfaction perceptions from other internet based services.

## *Dedication*

I dedicate this work to my family.  Their patience and support during my endeavour have made this possible.

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## *Acknowledgement*

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# 1 Introduction

Typical face-to-face communication relies on verbal and non-verbal cues (Moore et al., 2007). When the richness of multimodal communication, such as that in face-to-face (De Ruiter et al., 2003) is curbed through the use of mediating technology, the communicative process becomes leaner in terms of richness and this can be frustrating for the user, for example, gesturing with one's arms when speaking on the telephone (Verhulsdonck and Ford, 2009). The over-arching question of this research study was: how can we better understand another party when using virtual worlds as the mediating platform using consumer satisfaction as an example of complex communication?

Consumer satisfaction is seen as a key element to business success, the elicitation of satisfaction levels among consumers can help vendors assess and improve business performance (Farris et al., 2010). This thesis focuses upon the creation and development of a novel framework for eliciting consumer satisfaction perception using the enabling context of a social virtual world.

Virtual worlds are computer-based, networked, multi-user, immersive environments which fall into two basic categories: game worlds such as World of Warcraft[1] and social worlds such as Second Life[2]. Both types of environment allow for computer mediated shared experiences wherein users can interact with one another. Also, social virtual worlds do not have an explicit storyline, plot or the requirement to achieve pre-determined goals (Shukla, 2008). Although it should be noted that users of Second Life may choose to use it as a gaming environment; indeed many do with war-games and extended role-playing games being popular. Spence (2008) identified 112 virtual world projects for his research, however, other lists[3] of virtual worlds differ in content from the one by Spence due to the naming conventions and terminology used, see Chapter 2. Also

[1] See: http://eu.battle.net/wow/en/
[2] See: http://secondlife.com/
[3] See: http://arianeb.com/more3Dworlds.htm and http://www.virtualworldsreview.com/info/categories.shtml

the persistence of virtual worlds needs to be taken into account, for example Lively[4] offered by Google was available for approximately six months.

From this it can be seen that due to the leaner communication capability available within current virtual worlds, mechanisms in place in the real world cannot be easily transferred. Similarly feedback mechanisms as provided by web retailers such as Ebay and Amazon differ from those within immersive virtual worlds as these virtual worlds offer a variety of communication channels. Another issue here is that some communication methods available in virtual worlds do not occur in the real world, see section 1.4.1 for a fuller explanation. The situation is further complicated when we take into account, that although multimodal interaction is available, users may not use all of the modalities available (Oviatt, 1999).

Leaner communication capability in virtual worlds are exemplified by the limitedness of non-verbal cues. Users of virtual worlds are typically proxied 'in-world' by a character or 'avatar'. There is a limited translation capability from user to avatar in terms of body language and facial expressiveness, therefore, there is limited in-world communicative feedback (Gerhard et al., 2004; Moore et al., 2007).

Therefore, the central question in this research study was: In what way does the communication process differ in the real world to that which is conducted in computer mediated environments? The parameters of this question were narrowed by focussing on consumer satisfaction as a form of complex communication and Second Life as the chosen computer mediated platform to be investigated.

A Grounded Theory (Glaser and Strauss, 1967) approach was taken to the experiments conducted. Initially, a Glaserian Grounded Theory approach was taken with in-world experimentation which took quantitative methods as its basis. However, for reasons explained later in section 3.2.4 this approach was not deemed appropriate for further development. Therefore a Straussian Grounded Theory approach was adopted during further experimentation which took on a qualitative basis. Furthermore, the perspective taken here is an elaboration, or extension, of the concept of 'embodied mind' (Lakoff and Johnson, 1980). The embodied mind concept, sometimes referred to as embodied cognition, essentially takes the perspective of emphasising that the brain (and by

[4] See: http://www.lively.com/goodbye.html

extension the mind) has sensory and motor control function of the body which is necessary to negotiate useful interactions within the environment. Wilson (2002) disambiguates the concept into six inter-related but distinct sub-sets, of these the fourth sub-set, 'the environment is part of the cognitive system' is of most relevance here. Wilson explains this sub-set as: "The information flow between mind and world is so dense and continuous that, for scientists studying the nature of cognitive activity, the mind alone is not a meaningful unit of analysis. This statement means that the production of cognitive activity does not come from mind alone, but rather is a mixture of the mind and the environmental situation that we are in". With this understanding, consideration of what affects those interactions can proceed.

The majority of virtual world research has been conducted in Second Life (Spence, 2008), partially as it is a stable platform for conducting research. Another reason is that Second Life is one of the more popular virtual worlds, as Castranova points out, "large games should be thought of as, in effect, social science research tools on the scale of the supercolliders used by physicists". Therefore the virtual world used in this research study is Second Life, with the understanding that it is a platform for in-world consumers and vendors while simultaneously being a product for its developers Linden Lab, this is further explained in section 1.4. More specifically, the focus of this research study is on consumers of Second Life as a platform, that is to say the consumers of products or services in-world.

Virtual worlds have received increasing commercial interest (Lehdonvirta, 2009 and Hemp, 2006). Further, Blanchard and Markus (2004) point out that the creation of virtual communities among consumers is one route to business success and that the fulfilment (or satisfaction) of needs by individuals is a key requirement to building/maintaining successful communities (Blanchard and Markus, 2004; Langerak et al., 2004). Indeed, the recent development of Google Circles and the response to it from Facebook[5] shows that understanding community structure is commercially relevant to even the larger online content providers of late 2011.

Further, Balasubramanian et al. (2003) point out that "in online settings that are oriented toward self-service with little human interaction, many conventional service quality

[5] See: http://thenextweb.com/socialmedia/2011/08/18/facebooks-first-tests-to-start-combatting-google-circles/

dimensions ... are less relevant". For example the lack of multimodal feedback makes it difficult for trust formation (ibid.) as assurance and empathy are difficult to convey in virtual settings. However it should be noted that 'human interaction' is available in virtual worlds via avatars. How users interact and form communities should be investigated to identify how community building mechanisms would apply in a virtual world. An evaluation of the available literature pertaining to online communities will be used in addition to analysis of earlier experimentation from this research study as an underpinning to the development of the framework to be implemented.

The assertion by Balasubramanian et al., when viewed through the lens of the aforementioned difficulties with communicative feedback clearly demonstrates the requirement for an investigation into an appropriate feedback framework that is tailored to, and, appropriate for a virtual world such as Second Life.

## 1.1. Aim, objectives and contribution

### 1.1.1. Aim

The aim here was to identify how the elicitation of consumer behaviour and perceptions, focussed on consumer satisfaction, within the context of a multi-user, computer mediated, immersive environment could be achieved. This was accomplished through the analysis of individual and group-based interviews which were conducted in-world with users of Second Life.

### 1.1.2. Objectives

In order to accomplish the aim of identifying how elicitation of consumer behaviour in a virtual world setting could be achieved, the researcher focussed on the following as objectives:

- How consumer satisfaction is defined, understood and measured
- How virtual worlds function, both as a platform and a product
- How users typically perceive their experiences in virtual worlds
- How consumer satisfaction metrics could be translated into a virtual environment

### 1.1.3. Major Contribution

The major contribution of this research study has been the creation of a novel framework for eliciting consumer satisfaction perceptions in a virtual world environment. This framework provides an improved comprehension of consumer satisfaction perceptions from a user community based in a virtual environment, in comparison to other approaches used for understanding consumer satisfaction and/or virtual communities. The claimed improvement in comprehension is due to the 'holistic' nature of the framework developed, insofar as it takes into account the many and varied influences that affect consumer satisfaction perception in the physical, and by extension, the virtual realms. This framework was derived from a series of semi-structured interviews conducted in-world. The analysis of these interviews using a Straussian Grounded Theory approach enabled the development of the framework.

### 1.1.5. Minor Contribution

The minor contribution of this research study has been the novel approach to search engine trend analysis. Typically, the approache taken for trend analysis using search engines were focused on the volume of searches for a given keyword or phrase (Lui, 2011). Through the analysis of search volume, a researcher could determine the amount of interest shown for a given keyword or phrase at a particular time. For example, Ginsberg et al., (2009) used this approach to identify influenza outbreaks based on the search patterns adopted in those areas affected. However, the approach taken here has a fundamentally different basis. The focus here is on the volume of websites returned pertaining to a search phrase as opposed to the volume of searches made. In this context, by focussing on the volume of returned websites the results returned can be perceived as indicative of the amount of interest generated by a given Second Life location. Furthermore, this approach can be seen as an indicator of user satisfaction (either in a positive or negative sense) as the websites returned by a search engine are essentially documents that relate to a given Second Life location where someone has taken the time and the effort to generate that document.

## 1.2. Chapter summary

In this introductory Chapter an overview of this research study is given demonstrating the need for it to be conducted as well as its aim and objectives. This is followed by some contextualisation of this research study, especially with regard to the need for

organisations to be able to engage with their clients or audience. After this contextualisation the more pertinent aspects of Second Life are described.

Chapter 2 is an overview of the relevant literature and details consumer satisfaction in virtual worlds, consumer satisfaction modelling and virtual community. Here a definition of consumer satisfaction is given as well as an indication of how the concept can be perceived in terms of building an elicitation framework. Further, the way in which consumer satisfaction is modelled and virtual communities are perceived and understood in the literature is given along with a critique of their short-comings. Finally, direction is given as to how the elicitation framework can take into account the factors that the previous approaches have not.

Chapter 3 explains and evaluates early experimentation carried out by the researcher. A quantitative approach to investigating group size, membership and joining rates is described as well as the reasoning behind abandonment of this line of investigation any further during this research study. Further, the development of both a web based survey and an in-world artefact are described as well their testing for appropriate data transfer. Although this initial experimentation was largely abandoned the lessons learned from these investigations formed the basis from which the elicitation framework was created.

The framework and each of the inter-related component parts that it is made up from are then described in detail in Chapter 4. Here the meanings of the component parts that the framework is made up from are given. Further, the experience gained through the initial experimentation as well as from the influence of the literature is implemented. This chapter describes the essence to the major contribution of this research study.

An evaluation of the framework is then given in Chapter 5. Here the framework is used as a basis to comprehend the data collected through semi-structured in-world interviews. Further, an explanation is given for the refinement of the framework as a consequence of that evaluation. This chapter gives clarification and further detail about each of the framework component parts as well as examples from the interviews conducted. Examples are also given of how each component part inter-relates with the other component parts of the framework as part of the major contribution of this research study.

Chapter 6 details further experimentation using a novel approach to search engine trend

analysis, this uses the framework as its basis, essentially the minor contribution of this research study are described here. The approach taken focuses on the interrogation of three search engines with a variety of Second Life location names. Averaged results from the search engines are compared with a Second Life patronage metric for the same in-world locations.

Chapter 7 is essentially a further discussion of the outcomes from the experiments conducted and their results. Specifically here, there is interpretation of the data from the experiments conducted throughout as well as their broader meaning when brought together. Further, within this Chapter is a discussion regarding the application of knowledge gained from the literature as to how the literature and the earlier experiments gave basis to, or influenced, the framework developed.

Finally in the concluding Chapter, an overview of how the framework can be used by others is shown along with the wider context of its use in other mediated environments.

## 1.3. Contextualisation and motivation for this research

Through 2007-9 the researcher worked on 'Emerge', a JISC funded research project, as well as 'Ambition', an Arts Council England project. The role undertaken on both projects was as a project researcher with specific duties dependent upon the focus of each project. Involvement in these projects had a profound impact on this investigation.

The JISC funded Emerge project[6] was predominantly a 'synthesis and support' project with an underlying theme of creating a sustainable Community of Practice. The focus of the support and the community in question were the projects involved in the JISC funded Users and Innovation programme. In January 2008, during the Users and Innovation programme start-up meeting an informal workshop was held on the use of Second Life. This was an introductory workshop for those unfamiliar with Second Life and was run by Steven Warburton from the University of London and a Visiting Research Fellow at King's Learning Institute, King's College London (Warburton, 2009). Although a number of the Users and Innovation projects were Second Life based, many of the delegates to the start-up meeting were inquisitive about this technology. It was during this workshop that

[6] See: http://reports.jiscemerge.org.uk/

the use of Second Life as a platform for investigation was seeded.

The Arts Council 'Ambition'[7] project was run by Rudman Consulting and the Manchester Digital Development Agency and was primarily focused on the development of best practice IT solutions in the business processes of selected arts organisations in order to become more self-sufficient. The self-sufficiency aspect was instigated due to the demand on the Arts Council for funding as well as the recognition that Arts Council funding would decline in the run up to the 2012 Olympics.

Through Ambition, funding was made available to arts organisations based in the East and North-East of England for both hardware and software. Additionally all of the organisations were allocated a business consultant whose role it was to assess the then current situation of the organisation and offer strategic assistance for development. All of these arts organisations were small to medium sized, consisting of up to 10 people in administration roles. Further, the project was interested in the creation of a sustainable online community of practice within the arts/cultural sector. The hope was that best practice IT solutions once seeded with the participant organisations would flow to other arts organisations by means of the online community.

The researcher was a member of a project team from the University of Bedfordshire which was tasked to develop bespoke software for knowledge sharing as well as to produce a series of case studies. The purpose of these case studies was to document the change-process that the arts organisations underwent during the Ambition project. The software developed has less of a bearing to this thesis but further details can be found in Bessis et al., 2009.

With regard to the case studies, a multi-method approach was taken to gathering data from a sample of the arts organisations involved in the project (Bessis et al., 2009). Primarily data gathering was by means of focus group activities where the generic past, present and future circumstances of the individual participant as well as the organisation they were representing was elicited. Following this, interviews were conducted with the sample organisations to gain a deeper insight than could be achieved during the focus groups. Additionally, the allocated consultants of the sample organisations were also interviewed in the same vein. Further data was collected from 'blogs', email exchange and other such communications between the organisations and the researcher. Further,

[7] See: http://www.getambition.com/

documentation supplied by the Ambition team such as initial risk analysis were also used.

Issues that were raised by the arts organisations during the production of these case studies gave a fertile context to the line of inquiry stated earlier about mediated communication. What became apparent during the completion of the case studies, which were in essence an overview of the experiences of the selected organisations during the project was an apparent gap or obstacle in their communications capability. The desire for audience interaction and/or feedback was a theme that occurred through all of the organisations reviewed. All of the organisations went on to use some form of web based technology to address this issue. This raised questions as to how exhibitors or even individual artists can gain meaningful interaction with their audience. Conversely there was also the issue of how audience members could communicate with one another on their thoughts of a given gallery or exhibition as well as with the organiser of a display.

The requirement of an event organiser to communicate with their audience and of audience members to communicate with an organiser as well as amongst themselves was the basis from which further investigation was pursued. Indeed the use of virtual worlds for their immersive capability was identified by some of these organisations as a solution. For example one of these organisations was the Royal Liverpool Philharmonic Orchestra who gained national[8] and international[9] press coverage when they delivered their 2007/8 season opening concert from Second Life. Further, the performance and installation within Second Life was heralded for its communications capability:

> The judges saw this as a great example of a not-for-profit keeping its finger on the pulse of new technologies. The Second Life presence not only took the orchestra to a new audience via non-traditional means, it also allowed that remote audience to discuss the music with the composer and conductor in a way only possible through interactive media.[10]

## 1.4. An overview of Second Life

Released by Linden Lab in 2003, Second Life has operated a free-to-use model since 2005. Second Life has its own internal economy based on Linden dollars (L$); the

[8] See: http://www.guardian.co.uk/music/musicblog/2007/sep/17/secondlife
[9] See: http://www.nytimes.com/2007/09/18/arts/music/18seco.html?_r=1&oref=slogin
[10] http://www.bigchipawards.com/page.asp?id=3048

economy has an approximate exchange rate of L$258[11] to $1(US). The third quarter of 2011 saw user held Linden dollars at $29.3 million[12], while the web based market place for Second Life goods saw approximately $4.8 million being spent there. Second Life uses a client-server architecture, see section 4.7, with a network of servers used to simulate regions of space in-world. A term in common usage by Second Life users is 'sim' meaning a region or location in Second Life. Although a full history of the development of Second Life is somewhat beyond the scope of this Chapter, there are many sources for those interested. An excellent primer on Second Life and its evolution is available as a series of online articles named 'The Virtual Whirl: A brief history of Second Life'[13], written by Tateru Nino.

The Second Life interface, also known as a Viewer, enables communication and interaction in-world. The initial learning curve involved in becoming acclimatised to Second Life had been criticised as being steep for new users (Warburton, 2009). In late February 2010, Linden Lab released their Viewer 2 which took an entirely new approach to the user interface design of the Second Life client. This new interface design has many similarities with web browsers in terms of navigation. The introduction of the redesigned Viewer using more of a browser paradigm came in concert with new orientation experiences as well as new base avatar choices. Orientation is the name given to the experience all newly registered users go through when they first enter Second Life as means of acclimatisation and learning the Second Life interface.

### 1.4.1. In-world communication

Available within Second Life are a number of in-world communications options. Predominantly these are: instant messaging, text and voice chat, note cards and some in-world interactive objects, such as opinion polls. All of these communications options can be accessed via the Second Life interface. Further, this interface allows for interaction with interactive objects as well as accessing the profiles of other users.

The following outlines how communications with other avatars can be conducted and is

[11] This is an average of posted exchange rates since Q4 2009, see http://community.secondlife.com/t5/Featured-News/The-Second-Life-Economy-in-Q3-2011/ba-p/1166705 and http://community.secondlife.com/t5/Featured-News/Q1-2011-Linden-Dollar-Economy-Metrics-Up-Users-and-Usage/ba-p/856693

[12] See: http://community.secondlife.com/t5/Featured-News/The-Second-Life-Economy-in-Q3-2011/ba-p/1166705

[13] See: http://massively.joystiq.com/2010/06/26/the-virtual-whirl-a-brief-history-of-second-life/

correct at the time of writing during late 2011. This is stated here as Linden Lab are continuously developing Second Life. Further, this outline is specific to explicit communication as opposed to implicit communication such as what information is ‘telegraphed’ by elements such as clothing choice, gender and ethnicity all of which can be chosen for a given avatar in Second Life.

Instant messaging (IM) can be used for synchronous or asynchronous communication between avatars. With regard to synchronous communication, when avatars are in close proximity to one another, IM is a form of private messaging in so far as only the parties involved can see the dialogue. IM can also be used for communication with avatars that are online but not in the vicinity; again, only the parties involved are able to view the dialogue. IM can also be employed asynchronously in the event of messaging an avatar when their user is not online. When IM is used in this manner the Second Life interface displays an alert to the communication originator that the intended receiver is off-line. The system will then store the message for display to the receiver when they next login to Second Life; the system can also send a copy of the message to the user by e-mail.

Second Life simulates open conversation through the use of 'chat'. This chat feature allows for synchronous, written communication between avatars within 20 metres of one another in-world. This is the default chat distance, however, chat can also be shouted or whispered with a change in distance of 100 metres and 10 metres respectively. Second Life also offers synchronous communication through the use of 'voice chat' which is an implementation of an in-world voice over IP (VoIP) technology. Voice chat is similar to the written chat of Second Life in that anyone within 60 to 110 metres in-world can hear the conversation dependent upon their user preference settings. The Second Life voice chat technology can also be used for synchronous private communication between avatars through the use of an interface feature known as 'private call', enabling only selected avatars to participate.

Note cards are virtual objects within Second Life that simulate, as the name suggests, a written note. Used generally for asynchronous communication, note cards can contain written text and hyperlinks and can be transferred between avatars as an in-world object. Hyperlinks in note cards are a good example of a mechanism available in the virtual space but not in reality.

Group communications tools are offered in Second Life that essentially allow for the IM feature to be applied to and across a whole group membership. Groups play a central role in structuring various social activities performed by avatars in Second Life and their nature is elaborated on in section 3.2.

Within the Second Life environment an avatar can also interact with scripted objects, any virtual object within Second Life can have a script embedded. The majority of objects seen within Second Life have been user generated, the exception being Linden Lab generated plant life and some stock buildings. User generated objects include; buildings, plant life, vehicles and clothing. These objects are typically created in-world from the suite of 3D building tools available. Second Life uses 'prims', a primitive based approach to 3D construction, essentially the use of basic three dimensional geometric shapes that the user can alter and allocate a texture to as required.

Scripting can be added to objects to either control that object in a specific way and/or allow for interaction with users. The scripting language used in Second Life is called Linden Scripting Language (LSL). Similar in syntax to C or Java, LSL is event-oriented rather than object-oriented. The most common ways interaction with scripted objects is achieved in Second Life are:

- Web-based content can be accessed via the inbuilt web browser.
- The chat feature can be used to interact with some scripted objects through the use of text, for example, doors can be scripted to open or close if a user types "doors open" or "doors close".
- A dialogue menu is an independent script-generated interface that manifests when an avatar interacts with a given scripted object.
- Right-hand click context menus are represented as pie menus which contain eight divisions, three of which can be used by a script to add further interactivity to a given scripted object.
- Head up displays, commonly referred to as HUDs, are virtual objects that can be worn in a similar way to clothing. Here clothing is worn by attaching a piece of clothing to a user's avatar by means of the Second Life interface. However, unlike clothing, head up displays can only be seen within the main Second Life interface of the user whose avatar is wearing it.
- Scripted objects can act as proximity sensors, for example simulating the sensors

of automatic doors in the real world.

## 1.5. Summary

Having described the various means by which communication can occur within Second Life a further evaluation of consumer satisfaction is required in order that a suitable approach is taken to conveying information between consumers and vendors.

# 2 Consumer satisfaction and virtual worlds

The consumption process within virtual worlds has been investigated through review and analysis of the most relevant literature. Of note is that Second Life has received the most academic interest from the available virtual worlds (Spence, 2008) from a variety of academic disciplines. One reason for this interest, as Castranova (2006) points out about virtual world research in general, is that virtual worlds can be perceived to be social science research tools in the same manner that a supercollider is perceived among physicists. The literature on virtual worlds tends to be focused on similar technologies and definitions but with authors often using different names to identify them. Virtual worlds, virtual environments, immersive worlds, synthetic worlds, meta-verse, and meta-worlds are some of the terms used in the literature. With this in mind, an overview of the most relevant works focused on virtual worlds follows as shown in Table 1.

| Section | Heading | Focus |
|---|---|---|
| 2.1 | Consumer satisfaction | Giese & Cote |
| 2.2 | Modelling consumer satisfaction | Kano Model & Servqual |
| 2.3 | Consumer satisfaction in virtual worlds | Guo and Barnes, Zhou et al., Lehdonvirta, Luz et al., Kaplan & Haenlein |
| 2.4 | Virtual community | McMillan & Chavis, Mousavidin & Goel |
| 2.4.1 | Community | Schriner & Kim, Hersberger et al. |
| 2.4.2 | Discourse Analysis | Jones & Rafaeli, De Souza & Preece |
| 2.4.3 | Relationships | Zhdanova et al. |
| 2.5 | Synthesis of models/frameworks | Synthesising: Guo & Barnes, Hersberger et al., Schriner et al., De Souza & Preece |

*Table 1. Literature Focus.*

## 2.1. Consumer satisfaction

Within this research study a consumer is perceived as someone that uses a product or service offered by another party. This could be as part of a commercial transaction or as a viewer or appreciator of artwork in a gallery for example. Essentially the consumer here is someone who has gone through, is going through, or intends to go through, an act of consumption.

Satisfaction here is a state of mind or 'feeling' resulting from the consumption of a given product or service but which can also be affected by other factors such as the emotional or physiological state of the consumer, as discussed in section 4.4. Further, the fact that these other influences and not just the product or service experience have an impact on the overall level of satisfaction is a central driver in the design approach of the framework developed during this research study.

One further factor which needs to be taken into account here is that, in marketing consumer satisfaction is often perceived in terms of 'positive feelings'. However, the focus in this research study is on the experiential impact on the consumer which can be perceived as either 'positive' or 'negative' in nature. This issue is further explored in section 4.4 where the rationale for taking this approach is given.

From the literature: in order to develop a useful definition of consumer satisfaction, Giese and Cote (2002) analysed 20 definitions of consumer satisfaction from the relevant literature. Giese and Cote (2002) assert that:

1) consumer satisfaction is a response (emotional or cognitive);
2) the response pertains to a particular focus (expectations, product, consumption experience, etc.); and
3) the response occurs at a particular time (after consumption, after choice, based on accumulated experience, etc).

(Giese and Cote, 2002, p. 3)

Further, Fundin and Bergman (2003) assert that knowing what satisfies and dissatisfies customers from their feedback is a critical factor for success. They point out that this concept has been implicit in the literature since the 1930s, and is just as relevant now, Cole (2001).

## 2.2. Modelling consumer satisfaction

Two frameworks for looking at levels of consumer satisfaction that are used across many disciplines such as marketing, economics, social studies and psychology are the Kano Model and Servqual (Mont and Plepys, 2003). While the Kano model is qualitative in nature and perceives the satisfaction to product/service relationship as non-linear, Servqual assumes a linear relationship between satisfaction and service performance and is quantitative (Tan and Pawitra, 2001; Baki et al. 2009). The Kano model categorises "the attributes of a product or service based on how well they are able to satisfy customer needs" (Tan and Pawitra, 2001, p. 421).

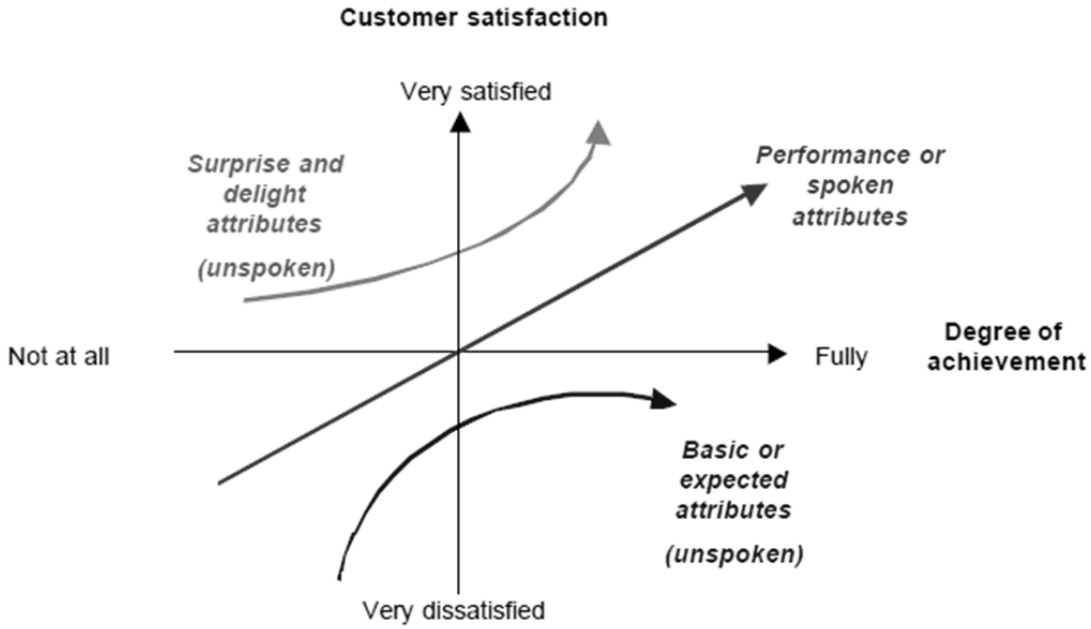


*Figure 1 A conceptualisation of The Kano model, adapted from Baki et al. (2009).*

The Kano model, as illustrated in figure1, shows three metrics that describe how consumer satisfaction requirements might be met; these are the performance, basic and delight attributions (Füller and Matzler, 2008). Essentially the model describes a spectrum of consumer satisfaction (vertical axis) against a spectrum of product functionality or service performance (horizontal axis). However there are two main drawbacks to the Kano model approach, which are - drivers and quantification (Tan and Pawitra, 2001). The Kano model has no inbuilt provision to identify drivers or behavioural intentions, and further, the model does not "quantify either the numerical or the qualitative performance of the attributes" (Tan and Pawitra, 2001, p. 422). In other

words, the Kano model concerns itself with only the product, service or experience that is being consumed as opposed to considering the wider context of the consumption of a given product, service or experience. Further, the Kano model does not easily lend itself to a quantifying the consumption feedback that is being sought by whoever is researching the consumption process. The most obvious way of seeing this is that there are no measurement markings in figure 1.

The framework developed in this research study as seen in figure 10 and then as seen in figure 22 in a refined form, takes a 'holistic' approach to the factors that contribute to the consumption experience. This is as opposed to the focussed approach of the Kano model. Further, although there is no specific measurement shown in the framework developed in this research study, the level of interrelationship between the various component parts is shown (figures 11-20). This measurement of interrelationship would be replicable by anybody else that adopted this framework to investigate their given audience.

In contrast to the Kano model the approach of Servqual (see figure 2), is to characterise service quality in terms of perceived service, that is the difference, or gap, between customer expectation and customer perception of a given service, for example in retailing (Parasuraman et al., 1988). Servqual was originally devised by Parasuraman et al., in 1985 and revised in 1988 (Mont and Plepys, 2003). Cullen (2001) identifies the primary issues, in terms of gaps, as:

Gap 1. The discrepancy between customers' expectations and management's perceptions of these expectations.

Gap 2. The discrepancy between management's perceptions of customers' expectations and service quality specifications.

Gap 3. The discrepancy between service quality specifications and actual service delivery.

Gap 4. The discrepancy between actual service delivery and what is communicated to customers about it.

Gap 5. The discrepancy between customer's expected service and perceived service delivered.

The first four gaps contribute to Gap 5 - that is, the gap between customer expectations and customer perceptions of service received (Cullen, 2001, p. 664).

With these gaps identified the original Servqual had ten proposed determinants to address

them (Parasuraman et al., 1985): tangibles, reliability, responsiveness, communication, credibility, security, competence, courtesy, understanding/knowing the customer and access. The model was subsequently refined to encompass just five metrics: reliability, assurance, tangibles, empathy and responsiveness (Parasuraman et al. 1988). The metrics in Servqual were measured by means of a Likert scale type survey.

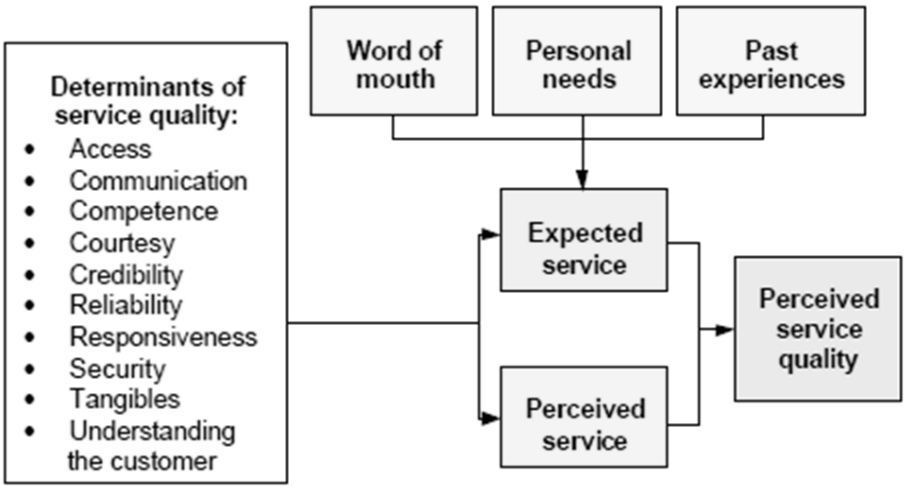


*Figure 2 A representation of the Servqual model, adapted from Mont and Plepys (2003).*

Although the Servqual framework has been used across a wide variety of sectors (Pizam and Ellis, 1999; Nyeck et al. 2002; Mont and Plepys, 2003) and has been described as "the most complete attempt to conceptualize and measure service quality" (Nyeck et al. 2002, p.102), the literature does provide criticism (Pizam and Ellis, 1999; Van Dyke et al. 1999; Mont and Plepys, 2003). Van Dyke et al. (1999) conceptualise these criticisms into the following:

1. the use of difference or gap scores
2. poor predictive and convergent validity
3. the ambiguous definition of the "expectations" construct, and
4. unstable dimensionality

Due to these shortcomings, Servqual has been used with other frameworks such as the Kano model (Tan and Pawitra, 2001; Baki et al. 2009). Furthermore, some authors such as Nyeck (2002) condone the use of entirely different conceptualisations or frameworks. One such approach was undertaken by Rowley (1999) who used metrics developed in the business sector by Tucker (1991a; 1991b) and applied them to investigate the customer

experience in the context of a small municipal museum and a specialist national museum (Rowley, 1999). Rowley points out:

> Customer satisfaction depends upon the total customer experience... A good quality service is one that offers users an experience with which they are satisfied. One way of assessing quality is to focus on customer satisfaction. (Rowley, 1999, p. 303**)**.

Indeed, museums and galleries are a useful area to focus on as they encompass commercial requirements as well as the not-for-profit sector (Gilmore and Rentschler, 2002). Also, there is strong tradition in analysis of visitor requirements using accepted and experimental methodologies (Hood, 1993; Doering, 1999; Gilmore and Rentschler, 2002; Macdonald, 2005).

Another issue identified by the researcher is that both the Kano Model and Servqual focus on the product or service in question without taking into account the many factors that contribute to why a respondent might answer a survey (for example) in the way that they do. A hypothetical example here might be a negative response from an individual due more to the fact that they are suffering from a head-ache or emotional turmoil after fighting with a spouse than any 'real' negative attribution they place on a product or service. To this end the framework created in this research study takes a broader perspective while still probing a respondent about specific likes and dislikes.

## 2.3. Consumer satisfaction in virtual worlds

Guo and Barnes (2007) follow an Information Systems approach in their investigation of virtual worlds. Guo and Barnes have developed a model that takes the perspective of specifically investigating procurement and trust issues within virtual worlds and is made up of ten component parts. Their approach is mainly evolved from the Theory of Planned Behaviour (TPB) originally by Ajzen in 1985, the Technology Acceptance Model (TAM) originally by Davis in 1986 and the Unified Theory of Acceptance and Use of Technology model (UTAUT) originally by Venkatesh et al. in 2003, amongst others. Seven of these components (trust, effort expectancy, perceived enjoyment, performance expectancy, social influence, perceived critical mass and behavioural intention) are from an amalgamation of these models in the literature and the authors have added three new components, namely: perceived quality, character competency as well as perceived

information asymmetry.

Guo and Barnes point out that "the likely outcome from testing the final model will be an extension to existing behavioural theories (e.g., TAM, TPB) via new constructs validated in the virtual game community domain" (Guo and Barnes, 2007, p. 74 ). Furthermore Guo and Barnes focus on investigating issues that relate to buying virtual goods and therefore do not investigate other concepts that can be part of the virtual world experience such as social networking, collaborative actions and so on.

Zhou et al. (2010) adopt a Uses and Gratification theory perspective to survey and content analyse user acceptance factors in Second Life. The Uses and Gratification theory originated from the mass media consumption domain. Three key components were investigated as motivations for user acceptance, these were: utilitarian, hedonic and social motivations (see Hirschman and Holbrook, 1982). They conclude that "the uses and gratifications theory is robust and useful in the development of theoretical dimensions representative of consumer motivations for social virtual world usage." (Zhou et al. 2010, p. 9).

The work by Lehdonvirta (2009) takes more of a sociological perspective and is focussed on what is involved in the buying of virtual goods and the revenue models required to make such purchases. Specifically, Lehdonvirta uses functional, hedonic and social attributes with an "information-oriented sampling" (p. 104) approach to study 14 different online environments, including Second Life, where users can purchase virtual goods. The attributes identified by Lehdonvirta were from the literature on the sociology of consumption and were sub-divided by Lehdonvirta under 9 further distinctions. Lehdonvirta posits these subsets as:

| | |
|---|---|
| Functional: | Performance, Functionality |
| Hedonic: | Visual appearance and sounds, Background fiction, Provenance, Customisability, Cultural references, Branding |
| Social: | Rarity |

Further, Lehdonvirta asserts that the functional, hedonic and social attributes can co-exist in the same virtual item with the most prominent determined by the situation. Finally, Lehdonvirta points out that the level of abstraction used in his work could be developed to a finer granularity for investigating a specific virtual good or service.

Indeed the refined framework in figure 19 has had functional (utilitarian) and hedonic elements added to it in order to help disambiguate some of the issues that arose the during data analysis part of this research study which concerned the user experience element of the framework as shown in figure 7.

An entirely different perspective is taken by Luz et al. (2008), who explore the idea of realism in digital gameplay. Luz et al. are highlighted here as they discuss the relationship between the real and the virtual focuses of a user, as well as what it means to be immersed in a virtual environment. Further they detail the implications of the physical interface being used in order to control and interact with the virtual environment. This work essentially demonstrates the usefulness of taking the embodiment concept, as highlighted in chapter 1, as a valid approach when exploring virtual environments.

Further, Kaplan and Haenlein (2009) considered Second Life as a platform of consumer use and business potential. Their approach was to conduct interviews with Second Life users regarding their social networks, identities and commercial exchange preferences. The authors acknowledge a variety of motivations for Second Life usage, stating them as "the search for diversion, the desire to build personal relationships, the need to learn, and the wish to earn (real-life) money" (Kaplan and Haenlein, 2009, p. 94). Of note here is that their findings point out that "users consider SL less as a mere computer game and more as an extension of their real life, and that they tend to engage in activities that span beyond the single usage occasion".

In conclusion, the application of factors from a different domain when contextually executed can offer a valid approach when used to consider satisfaction as demonstrated by Lehdonvirta (2009) using a sociological perspective. Further, we can see that when considering the virtual experience, the real-world experience of the user and their interaction with others must also be taken into account.

## 2.4. Virtual community

Having reviewed some different approaches to consumer satisfaction let us now turn to virtual worlds and some of the concepts inherent in our use of this technology. As stated previously, Second Life is a social virtual world and the concept of shared experiences

and sense of community (McMillan and Chavis, 1986) are integral to it. McMillan and Chavis (1986) raise points both from their own observations as well as from the literature. For example, the notion of community can be perceived as either geographical, such as neighbourhoods, towns and such or as relational where human relationships are the central focus. They also define a sense of community as having four main components, these are:

- Membership
- Influence
- Integration and Fulfilment of Needs
- Shared Emotional Connection

Each of these components is further clarified by the authors and illustrative examples of the dynamics between them are also stated.

The McMillan and Chavis definition has been of interest to researchers in the field of virtual communities such as Schriner and Kim (2007) as well as Hersberger et al. (2007) who have adapted it for their own work. However, the term virtual community is accredited to Rheingold with his 1993 book "The Virtual Community: Homesteading on the Electronic Frontier". Further, Mousavidin and Goel (2009) identify that within the literature studying virtual communities there are essentially three perspectives taken for the context within which virtual communities can be understood.

First, at the level of analysis of the community as a whole, research is focused on the sense of community felt by all members and the issues around it. Second, at the discourse level of analysis, the focus is on individual members and the content that results from the discourse in the community. Third, at the level of the analysis of the relationships between members, the focus is on ties and links among members (Mousavidin and Goel, 2009, p. 2). The following exemplify the three perspectives identified by Mousavidin and Goel.

### 2.4.1. Community

Schriner and Kim (2007) as well as Hersberger et al. (2007) take the sense of community construct by McMillan and Chavis (1986) as a basis to build their own conceptualisations.

Schriner and Kim (2007) specifically argue that the notion of a virtual community as a distinct entity is false as the participants are all rooted in the real world and therefore online communities are just an extension of the participants' reality. Further, the authors take the perspective that social organisations can be viewed as people centred rather than place centred. The research conducted by Schriner and Kim is based on online forums and the authors do not investigate any other technologies or methods of online community development, such as social network sites or virtual worlds. Further, the authors state that their work is meant "not to generalise findings for all online communities, but rather to offer a more solid framework in which to explore the characteristics of online communities".

Hersberger et al. (2007), proposed a conceptual framework, see Figure 3. The information exchange framework (IXF) is based on observations of a case study as well as the literature that investigates face-to-face communities and virtual communities, such as the work of McMillan and Chavis (1986).

Hersberger et al. take a 'holistic' approach with their model of virtual communities. The components of the IXF ascend from community focussed to individual focussed in progression from the base tier, tier 1 to the pinnacle, tier 4. Hersberger et al. (2007) also use what they call an 'affective dimension' and explain it as, "… the emotional contexts in which communities (first tier), social networks (second tier), information exchange (third tier), and information acquiring-and-sharing (fourth tier) take place". This is further clarified by acknowledging that the level of gratification or discontentment felt by an individual can be entirely different depending upon which tier is being examined.

Hersberger et al. (2007) use a case study to give examples of how the IXF can be applied. However, no explicit examples of what technologies were used for the case study are stated, although mention is made of discussion boards and the postings made to them. As the name 'Information Exchange Framework' suggests, the IXF is focussed on knowledge transfer but also includes a number of factors such as emotional connection, sense of membership and influence in its make-up.

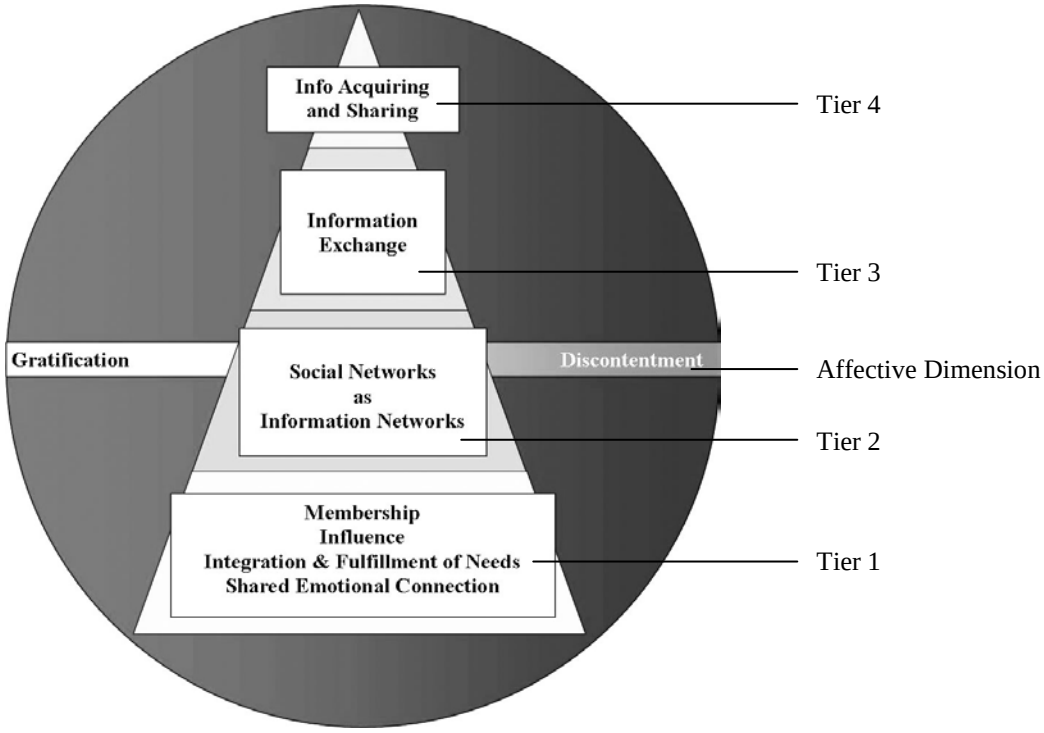


*Figure 3 The Information Exchange framework. Adapted from Hersberger et al. (2007).*

### 2.4.2. Discourse Analysis

Jones and Rafaeli (2000) take a discourse analysis perspective and argue that the emphasis on community has discouraged the research community from the appropriate analysis of collaborative media. They point out that "exploring the impact and significance of the essence of 'virtual communities', computer supported social networks, is both difficult and context dependent" (Jones and Rafaeli, 2000, p. 222).

De Souza and Preece (2004) also take a discourse analysis perspective to develop their 'Online Community Framework' or 'OCF' using the analysis of MSN Messenger[14] (a synchronous text 'chat' software system) communications as a basis for their work. The basis for the OCF is the concept of communication between users and designers during user interaction with a system. The framework is constructed around four key components; people, purposes, policies and software.

The OCF is essentially for designers or developers of online communities and allows for

[14] http://explore.live.com/messenger

the investigation of communication: person-to-person, person-to-system and system-to-person. The OCF takes the stance of design choice as a product of sociability in so far as the choices made by a designer should be based on their understanding of the user or target audience. Indeed De Souza and Preece explain it thus:

> The goal of the OCF is therefore to support evaluators, designers, moderators and users in identifying and understanding mainly *sociability* problems and related usability problems in online communities and other software that supports social interaction online… The purpose of the OCF is to help designers understand online communities, keeping in mind: the structure of their constitutive entities and the relationships among them; and the communicative aspects of computer-mediated human interaction that affect such communities.
>
> (De Souza and Preece, 2004, p. 581)

Although figure 4 seems somewhat simplistic, conceptually there is a great deal being related. The framework is based on defining an online community as "a group of people, who come together for a purpose online, and who are governed by norms and policies" (Preece 2000). One issue that may not be obvious on first inspection is that there is a bi-directional link between the software and the people, purposes and policies elements. It can therefore be concluded that the usability of software directly impacts on the sociability value of the software dependant on how it has been designed and how it is being used in context of the people, purposes and policies elements. Figure 5 goes some way to explain this.

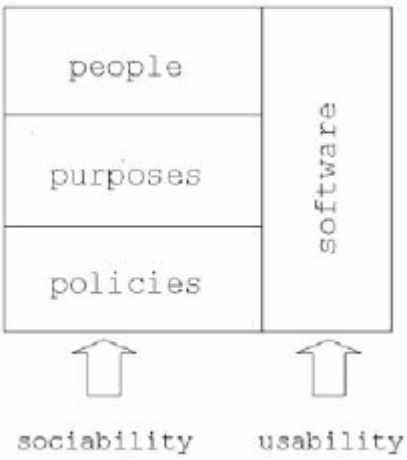


*Figure 4 The sociability and usability relationship (Source: De Souza and Preece (2004).*

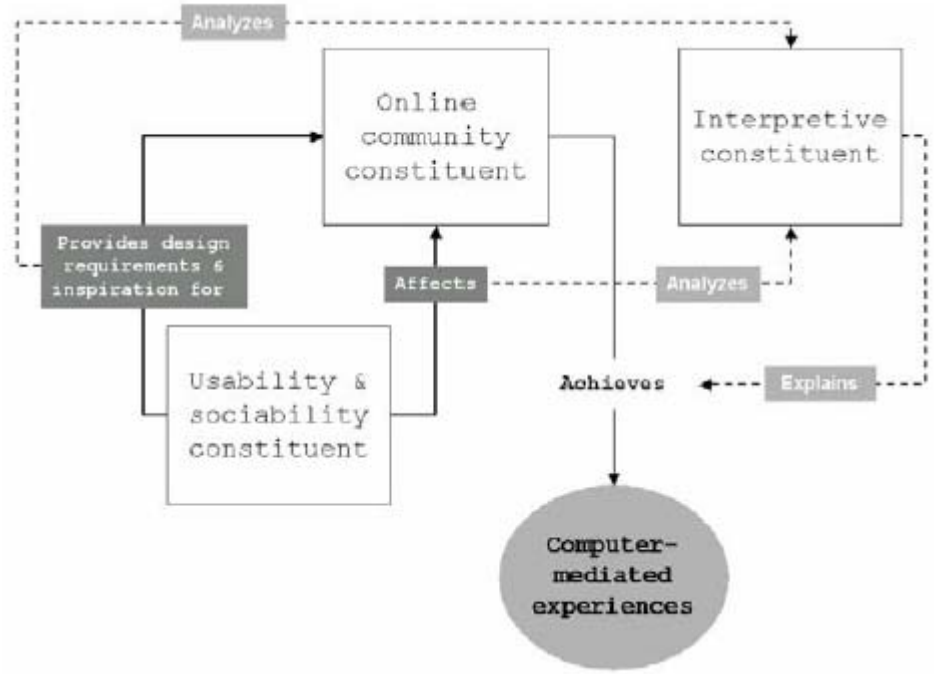


*Figure 5 The overall online constituent structure (Source: De Souza and Preece (2004).*

Figure 6 is an 'idealised abstraction' representation of the online constituent at the centre of overall OCF online constituent structure shown in figure 5. Indeed, figure 6 shows the main relationships between the included set of entities, such as individuals.

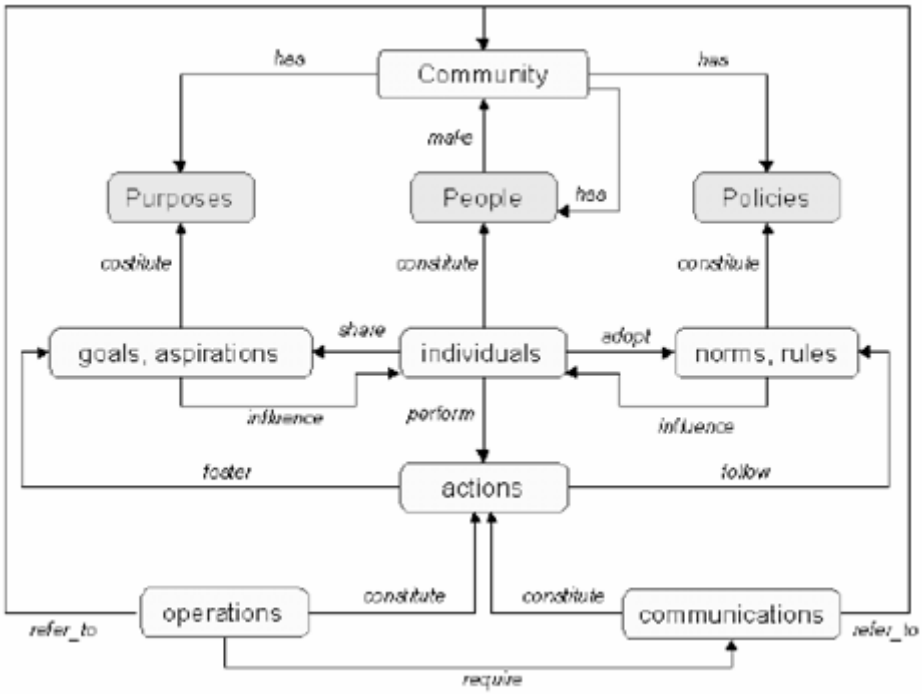


*Figure 6 Adaption of the online constituent from De Souza and Preece (2004).*

Testing of the OCF has been conducted by De Souza and Preece on scenario-based evaluations. The evaluations carried out by the authors considered and analysed different instances of problem solving based on the OCF. However, this framework is geared towards online forums and technologies such as instant messaging services and as such does not entirely capture the richness of virtual world experiences.

Further, the OCF has no explicit ecommerce element included. De Souza and Preece point out that: "it is not intended that OCF based models should be applied to a whole online community. Rather, it is intended that it can be applied to particular aspects". Finally, a perspective not covered by De Souza and Preece is that designers' choices are influenced by many factors such as budget, competition and project time scales and designers/developers are more likely to integrate components based on what they believe their target audience desires rather than from the perspective of 'what is the designer communicating to the user?'.

One key concept that resonated with the researcher which De Souza and Preece highlight was that of an interaction with a system as being transparent. For example in Second Life a user can use asynchronous messaging for a friend, when that friend is not online. The message is made available to the recipient upon their next login. However, what actually is occurring is that the first user sends a message to 'the system' identifying the recipient as the target and when the recipient next logs-in, the system sends them the message. Therefore the system is a tertiary and 'transparent' party in this communication process. This is essentially the same process as when a voicemail is left when using mobile-phones, with the voicemail software/functionality being the tertiary party. This is a major contributory factor to the placement of the interaction element in-between the user experience and Second Life elements in the framework that was developed for this research study.

### 2.4.3. Relationships

Finally, Zhdanova et al. (2007) take the approach of analysing how relationships are important to investigate from a network analysis perspective. In their paper 'Social networking used as a model for web community' (2007) the authors assert the idea that communities can be measured based on three components (users, concepts and objects) with their linkage strength measured in terms of the popularity of objects and the capacity of subjects.

## 2.5. Synthesis of models/frameworks

A very early approach taken during this research study was a synthesis of the models/frameworks by Guo and Barnes (2007), Hersberger et al. (2007), Schriner et al. (2007) and De Souza and Preece (2004). This was achieved through an iterative process of reading and highlighting relevant text from the authors, known as 'pawing' (Ryan and Bernard, 2003). This was followed by an analytico-synthetic approach (Lambe, 2007) which is essentially the deconstruction of material into component parts and re-construction into generic terms in a similar way to how 'conceptualising the abstract' and 'categorisation' is conducted in Grounded Theory (Strauss and Corbin, 1998). This approach enabled a comparison of the frameworks/models with the deconstruction of the model/framework component parts kept at the same general level of granularity as first presented in the various works. For example, the work by Hersberger et al. has, essentially, eight components as originally shown in figure 3.

### 2.5.1. Real World and Online Communities

The explicit relationship between online community and the real world are acknowledged, and to some extent elaborated upon, by all but the Guo and Barnes model. The model by Guo and Barnes is focussed on the transaction of virtual assets and does not specifically state an inter-relation with the real world, although the use of real money to buy 'virtual assets' is inherent to their work. The OCF from De Souza and Preece is applicable to both communities that exist entirely online as well as to those that have a face to face element involved in their online community. Hersberger et al., agree in so far as they perceive online communities as sharing many characteristics with face to face communities and elaborate on how useful concepts for describing real world communities can be used with online communities. Schriner and Kim explicitly state that their model relates to the 'interplay' between the virtual and real world experience. In essence the Hersberger et al., framework and the Schriner and Kim model are both vying to explain the same notion of virtual or online communities.

### 2.5.2. Communications and Communities

Communications is an important aspect of the De Souza and Preece OCF as mentioned earlier (2.3.2). Their investigation of communications was not only perceived as being between users but with the system as well. De Souza and Preece approach the idea of

communication from the perspective of natural language communications as well as sign systems, for example, buttons and menus signify actions with the system.

Further, the entire thrust of the Hersberger et al. is about the communication process in online communities with regards to formal and informal information sharing and exchange. According to Hersberger et al. the type of communication is dependent on the tier of the framework that is being focussed on. For example, part of the Membership level (which is the base tier in figure 3), that the authors describe as a 'common symbol system' this can be as simple as the use of emoticons and/or the use of specialised or shortened terminology. The authors also point out that the more users of a community interact with one another, the more likely they are to become emotionally close.

Likewise, much of the Schriner and Kim model is based on the communications process. The authors point out that their model is designed to explore the extent to which communications enable integration into a group for the individual and also the level of contribution to community building. The authors contend that these factors help establish a 'sense of community'.

The Membership and Influence elements from Tier 1 of the Hersberger et al. framework directly maps across to the 'Sense of Belonging and Influence elements' in the Schriner and Kim model. The authors of both works acknowledge that these elements are based on the work of McMillan and Chavis (1986). In fact the whole of Tier 1 of the Hersberger et al. framework is made up of the four elements that McMillan and Chavis use to define 'Sense of Community'. The change in focus from community to individual as in the Hersberger et al. framework is not, however, represented in the Schriner and Kim model and any further direct mapping becomes more problematic. However, there is a match between the Information Exchange element (Tier 3) of the Hersberger et al. framework and the Communication and Shared Real World Connection element from the Schriner and Kim model. The match with the Communication and Shared Real World elements can be seen when we consider the Information Exchange element that Hersberger et al. describe as "communities are primarily built and supported through formal and informal communication" as well as "people communicate more readily if they perceive that the strangers online with them share common interests" (Hersberger et al., 2007).

### 2.5.3. Emotional Connection

There is also a shared space between the Social Networks as Information Networks element (Tier 2) in the Hersberger et al. framework and the Human Personality Traits element of the Schriner and Kim model. Here the Human Personality Traits are suggested as being "critical to engaging and sustaining individual involvement in community" (Schriner and Kim, 2007). This can be juxtaposed to the concept of Social Capital from the Hersberger et al. framework, which is described as "an investment in social relationships with anticipated return" (Hersberger et al., 2007). Issues of emotional connection/expression have also been explicitly identified in the Hersberger et al. framework as well as the Schriner and Kim model. These stem from the 'shared emotional connection' aspect from the work of McMillan and Chavis. However, the Schriner and Kim model does not measure emotional bonding, the authors stating that this can be measured in other ways such as being correlated to 'belonging'. The Guo and Barnes model has an explicit 'Perceived Enjoyment' component which can also be considered as an emotional indicator. Trust has been identified explicitly in the Guo and Barnes model as well as in the Schriner and Kim model. Trust is also implicit in the work by De Souza and Preece as well as that of Hersberger et al.

With the OCF De Souza and Preece state that; "sociability is concerned with social interactions in the online community while usability is concerned mostly with what happens at the human-computer interface" (2004). De Souza and Preece go on to explain that a great deal of the online experience is based on how well the software being used by a community matches the sociability and usability needs of that community. The interpretive constituent of the OCF "matches the usability and sociability design goals with how they affect the community's experiences, and explains how technology enables the achievement of computer-mediated experiences" (ibid). The authors perceive the online community constituent of the OCF as being part of the software setting and as such it is a part of the "computer-mediated human experience" (ibid). The usability and sociability constituent of the OCF is described as providing the requirements and inspiration (or goals) for designing and directly affecting the online community. From this we can see the complementary relationship that the OCF has to the Schriner and Kim model and the Hersberger et al. framework. This relationship exists in so far as notions of influence and emotional connection are expressed implicitly in the OCF as opposed to the more explicit representations that are described in the Hersberger et al. framework or that in the Schriner and Kim model.

## 2.6. Summary

In summary, having considered the approaches taken in the literature to consumer satisfaction in virtual worlds, modelling consumer satisfaction and virtual community it has been shown that the application of factors from a different domain can offer a valid approach as demonstrated by Lehdonvirta (2009) using a sociological perspective. Further, we have seen that when considering the virtual experience, the real-world experience of the user and their interaction with others must also be taken into account.

Further, that museums and galleries can be focussed on as they encompass commercial requirements as well as the not-for-profit sector (Gilmore and Rentschler, 2002). Also, that there is strong tradition of visitor requirements analysis using accepted and experimental methodologies (Hood, 1993; Doering, 1999; Gilmore and Rentschler, 2002; Macdonald, 2005).

# 3 Initial experimentation

As part of the research it was necessary to explore Second Life by means of an avatar while maintaining the necessary objectivity of a researcher. Initially in-world investigation was conducted in order to become comfortable using the interface and to explore the features that Second Life offered. During this time observation was made by the researcher as to how other users were interacting with one another as well as their use of Second Life. These observations led to further investigation and experimentation. Publications from these investigations can be found in Appendix 1.

When conducted the following were essentially exploratory experiments. In the long-term however, these early experiments essentially became pilot studies due to the 'lessons learned' from conducting them as well as the results gained from them. For example, the experience gained from the 'total customer experience' approach taken to the survey questions in section 3.3.1 strongly informed the creation of the questions for the semi-structured interviews in Chapter 5**.** Further, the experience gained through conducting these earlier experiments led the researcher to an increased understanding of the complex issues involved in two of the four main objectives as specified in Chapter 1, namely:

- How virtual worlds function, both as a platform and a product
- How users typically perceive their experiences in virtual worlds

It should also be noted that the experience gained during these earlier experiments also enabled the researcher to have a well grounded knowledge of the Second Life interface. Indeed this was crucial in knowing what was possible during later experiments, for example the 'traffic' metric used in the component cross-check experiment as described in Chapter 6 would not have been possible without this prior knowledge.

With regard to appropriate ethical behaviour, during interaction with other users the purpose of the research was made explicit and the option for them to disengage without consequence made clear.

The rest of this Chapter details the initial experimentation conducted by the researcher. Also, the rationale, results and criticisms and/or drawbacks of the experiments are given. All of the data for this Chapter can be found in Appendix 2.

## 3.1. Candidate Techniques

Initially a variety of candidate techniques as methods for further investigation were considered in order to meet the aim and objectives as shown in Chapter 1. The following is a synopsis of the candidate techniques that could be used for the purpose of identifying consumer behaviour regarding satisfaction in Second Life.

Ethical considerations and permission by users is not shown for the sake of brevity here. These would of course require considered implementation when the candidate techniques chosen were actioned, as outlined in section 5.1 with regard to the developed framework. Location selection, where indicated, is also assumed to be appropriate in terms of traffic quantity and variety of patrons. Again this is for the sake of brevity here but is detailed in section 3.2.3.

Technique 1: Screen capture, movie, of avatars at a location.
Issues: This would reveal length of stay if arrival and departure is captured, interactions (artefacts and other avatars) and focus points, e.g. lingering in front of a portrait. However care would need to be taken regarding motivation, e.g. were they lingering by a product while deciding to buy or was the user simply away from their keyboard. Further consideration required to align popularity with satisfaction.

Technique 2: Screen capture, incremental images, of a given Second Life location.
Issues: This method can be deployed over a much longer period of time than a movie screen capture (purely from a data storage point of view). This could reveal customer flow and interaction hot spots. The increment value would need to be chosen and tested carefully in advance for optimal results.

Technique 3: Screen capture, following a given avatar recruited for observation.

Issues: This approach would reveal individual, possibly idiosyncratic, behaviour. Observations on a larger scale could mitigate idiosyncrasies.

Technique 4: Recording in-world mechanisms, individual.

Issues: A variety of in-world mechanisms exist which could be used to identify behavioural characteristics of an individual. For example an avatar profile can reveal groups joined or favourite locations.

Technique 5: Recording in-world mechanisms, general.

Issues: A variety of in-world mechanisms exist which could be used to identify behavioural characteristics from a generic viewpoint. For example the in-world search mechanism has a variety of search criteria that could be leveraged to gain information about group behaviour.

Technique 6: Observational video of user using Second Life.

Issues: This approach also would reveal individual, possibly idiosyncratic, behaviour. Also, the use of eye-tracking technology could be useful here. Observations on a larger scale could mitigate idiosyncrasies. This approach of recording a user would most likely need to be used in tandem with another approach as recording the user alone reveals little about in-world behaviour.

Technique 7: Recording voice chat (see section 1.4.1) from a Second Life location.

Issues: Essentially this would be listening to conversations via the audio chat facility. This could reveal decision making processes regarding purchases. Care in analysis would be required regarding inflection, tonality, humour and such like.

Technique 8: Chat logs of a given avatar.

Issues: Analysis of written chat logs could be insightful to the decision making process regarding purchases. Although from this approach alone it would be difficult to gauge where the avatar was. Insight could be gained regarding social interaction e.g. differences in terminology based on gender, status etc.

Technique 9: Chat logs at a given Second Life location.

Issues: Analysis of written communication at a given location could reveal decision or purchase behaviours. Further, comparison could be made by gender or perceived status for common terminology.

Technique 10: Interviews with users.

Issues: Depending upon the structure of the interview much could be gleaned by interviewing users. Care would need to be taken regarding interviewee selection in order to avoid bias (location, time-zone, gender and so on).

Technique 11: Interviews with avatars.

Issues: Interviewing a variety of avatars in-world could avoid bias regarding time-zone, gender and so on.

Technique 12: User focus groups.

Issues: Similar issues as with interviewing users regarding bias. Care would also need to be taken regarding group dynamics insofar as are those that are vociferous dominating those that are perhaps a little shy.

Technique 13: Avatar focus groups.

Issues: As with user focus groups care would need to be taken regarding group dynamics. However, instant messaging technology in-world would allow for private conversations, if only to check on the quieter members present.

Technique 14: Self report by users.

Issues: Paper based or online surveys could be administered. Selection of those invited to participate would need care to avoid bias.

Technique 15: Self report by avatars.

Issues: Online or in-world surveys could be administered using a variety of methods and/or technologies.

Technique 16: Full avatar tracking.

Issues: Tracking all data for an avatar can only be provided by Linden Labs. However, screen capture following an avatar during usage of Second Life is entirely possible. Further this approach in combination with user observation and an interview could be very revelatory about in-world behaviour as well as motivations. A large amount of data would be required for each participant and participant selection by invitation/volunteering would need to avoid bias.

Technique 17: User Electroencephalograph (EEG) during SL use.

Issues: A trained professional in the use of an EEG as well as the interpretation of the data output. The appropriate equipment would be required. Of note here is that the equipment need not be overly expensive[15].

Technique 18: User Functional Magnetic Resonance Imaging (FMRI) during SL use.

Issues: A trained professional in FMRI use would be required as well as the appropriate equipment. The use of either EEG or FMRI technology is currently not discrete for the user. Both EEG and FMRI measure brain activity. However, EEG is accepted as a surface scan of the brain with FMRI being capable of deeper scanning (Warwick, 2010).

Technique 19: Video of user for Facial Action Coding System (FACS) analysis.

Issues: Implementation could be via the use of a high resolution webcam attached to a user's monitor. A trained professional in the use of FACS analysis would be required, typically this type of expertise comes from the law enforcement community.

Technique 20: Polygraph of user in during SL use.

Issues: Polygraph machines measure skin conductivity, blood pressure and pulse. Sensor attachment could affect the user's ease of movement.

## 3.2. Predictability and group size

Groups in Second Life are an organisation mechanism which require two or more members and allow these members to gain communications and access privileges that

[15] http://openeeg.sourceforge.net/doc/

non-members cannot. The hypothesis here was that quantitative data from group size could predict behaviour within Second Life. This hypothesis was eventually proven false as explained in section 3.2.4. The paper "Predicting Group Size in Second Life" (Shukla et al. 2008) explored the possibilities of using mathematical approaches, for example Set Theory and First Order Logic, to model predictability by investigating the correlation of group size/membership over time.

Groups in Second Life share characteristics with Communities of Practice (Lave and Wenger, 1991) which essentially relates to "groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly" (Wenger, 2006). Bosua and Scheepers (2002, p. 4) point out that when Communities of Practice: "… are geographically dispersed and cannot communicate face-to-face, some infrastructure is needed to promote collaboration, communication and participation of its members". Further, there are similarities between groups in Second Life and those found in online social networking sites such as Orkut or Facebook. The study of social networks is not a new phenomenon and there is extant literature available in this subject area which now also includes the study of online social networking. The analysis of online social networks is typically focussed on the 'small world' effect, diffusion and clustering with regards to groups and group membership. Graph theory and network theory tend to dominate this area of research as the most applicable tools. The works of Backstrom et al. (2006) and Mislove et al. (2007) are recommended to the reader as a grounding in this field.

The rationale for this line of investigation came from the observation that 'groups' play a central role in structuring various social activities performed by avatars in Second Life. This was of particular interest as the creation, management and information dissemination to groups had been observed as a means to market certain products or services. For example, the Warner Brothers promotion of the TV show 'Gossip Girl' facilitates Second Life groups for this purpose.

Further, a user of Second Life can join a group either by invitation, private application or public application. Groups can be joined in Second Life either for free or by paying a joining fee. Therefore the analysis of group activity or membership within a virtual community could be used to inform a marketing strategy. Although the aim of the investigation was not in itself meant as a marketing strategy, it was felt by the researcher

that there was value in the identification and suitable use of mathematical models evaluating the existence of a correlation between time and the size/success of a group.

The intention here was to investigate in Second Life the existence of a correlation between the number of members in a group (group size) and the length of existence of that group (time), with the assumptions that:

- The time aspect of the investigation could be expressed either in terms of a given period or in relation to the amount of time lived in-world by a new avatar.
- The investigation is not focused on the specific nature of the psychological, social or economic factors that may be determinants on an avatar joining a group.
- That any avatars may or may not be members of multiple groups at any given time.

The issues considered by the researcher for in-world data collection to assess group size over time, user membership to different groups and new user group-joining rates will now be described. Further, sections 3.2.1-4, explain the approach taken by the researcher to gather data as well as the pertinent constraints or disadvantages of the approach chosen.

### 3.2.1. Group size over time

To record group size over time, data was collected on 6 groups. By using the 'Search' function of the Second Life interface searches for Groups were executed, essentially Technique 5 from the candidate techniques was used. These searches were done at regular intervals using arbitrary keywords based on education, recreation and food with the results being recorded. Groups 1-3 were larger groups, with membership ranging from approximately 600 to 6000 and groups 4-6 were smaller groups with membership ranging from around 10 to 30 members. The data for group 3 was unusable due to a high change rate of groups that were displayed in the search results.

Group 1: Increased by 3% from 6244 to 6435 members

Group 2: Increased by 28.8% from 1151 to 1482 members

Group 4: Had a consistent membership of 11 members

Group 5: Declined by 13.6% from 22 to 19 members

Group 6: Had a consistent 27 members

These results show that groups over a given size keep growing until they plateau whereas smaller groups tend to remain at a relatively consistent size. However, this conclusion

can be questioned on the grounds that this method of data collection did not take into account any information on current *active* membership. This is true insofar as there was no differentiation between users who were active in using Second Life and those who had not done so for a number of years.

### 3.2.2. User membership of different groups

By using the group listings provided from the group searches described earlier, another strand of investigation can be conducted. From the group search results a group can be chosen and the details for each of these chosen groups can be individually viewed. Further, the membership of that group can be viewed and recorded. Once the membership of a group had been recorded then the affiliation of each member to other groups can also be viewed, essentially the use of techniques 4 and 5 from the candidate techniques. This method can reveal whether there is a correlation between group members and the number of groups joined. Groups 4-6 were analysed to see how many other groups were joined by each individual and if there was any clustering of interest.

- The 11 members of Group 4 were in 67 other groups. Only two of these other groups had more than one member from group 4, this showed a 3% shared interest in other groups.

- The 18 members of Group 5 had joined 175 other groups. Of these 175 groups 12 groups had more than one member from Group 5, leaving 163 groups which had been joined by only one member from Group 5. This was a 6.9% shared interest in other groups.

- The 27 members of Group 6 were in 86 other groups. From these 3 groups had more than one member from Group 6. This showed a 3.5% shared interest in other groups.

As there was a range of 3-6.9% of shared interest in other groups as shown, these findings show that there is relatively little clustering of shared interest among the membership of the groups looked at, insofar as joining groups is concerned.

### 3.2.3. New user group-joining rates

To evaluate new user group-joining rates the researcher went to go to a given in-world location where the profiles of passers-by could be activated, essentially technique 4 from the candidate techniques was used here. Then, the 'date of birth' and the number of groups that were joined by that avatar could be recorded. This approach did raise some interesting questions about location, traffic flow and privacy. With regards to location, should the location be random or pre-selected? If the location is random, then can traffic flow to the location be guaranteed? If the location is pre-selected then can obvious bias be overcome?

Bias here was in the form of selecting a location that was 'easier' for the researcher insofar as traffic flow was good. Bias of location could also occur due to only certain types of user being attracted to visiting that location, for example certain types of product being on sale in that area or a general meeting place for a given social/geographical/(etc) grouping. Traffic flow or the number of available avatars to get data from would need to be substantial enough for the data set to be significant within a realistic time frame. The time zone that a user is in would also need to be taken into account. Again bias could have arisen in the selection of the data set if only users from the same time zone as the researcher were chosen. Therefore the data set would have to be collected taking into account the different peak and off peak traffic from different time zones.

One possible approach was to use one of the 'tele-hub' locations where new avatars are sent to after completing their induction training. This type of location is useful as traffic flow is usually high with new avatars arriving regularly throughout any given 24 hour period. Profiles of avatars would be selected and their name recorded with only those being 'born' that day being used for the data set. Then on a regular basis the profiles of given avatars would be searched for and the number of groups joined recorded. What could not be determined by any of the methods mentioned was the amount of time spent in-world by a given avatar.

Over a period of 35 days, 70 new users were tracked daily to monitor how many groups they joined. Of these 70 users, 26 (37.1%) joined groups.

- 18 users joined 1-4 groups, which was 25.7% of the 70 new users and 69.2% of those that joined any groups.

- 5 users joined 5-9 groups, which was 7.1% of the 70 new users and 19.2% of those that joined any groups.

- There was 1 user in each of the 10-14, 15-19 and 20-24 groups joined ranges. This was 1.4% of the 70 new users and 3.8% of those that joined any groups.

Joining up to 4 groups was the preference of approximately a 25% of all the new users that were monitored. However, 62.9% of these new users joined no groups at all within their first 35 days in Second Life.

### 3.2.4. Group size over time – concluding remarks

A combination of the methods outlined could enable a cube analysis approach with regards to Recency, Frequency and Abandonment. The Recency element would only be possible if 'Last Login' data was collected, this is available via the interface. As such, the Recency element would provide data about the last time an avatar was active in-world. The Frequency element would provide data with regards to the number of groups an avatar has joined, while the Abandonment element would provide data to identify which groups are of high or low value to an avatar in terms of 'churn' rate (the amount joiners or leavers).

The use of a software agent to collect data in a similar manner to the approaches mentioned would also be possible. However, there exists the question of whether using this type of agent for data mining purposes would be in contradiction to paragraph 4.2 of the Second Life Terms of Service which states "You agree to use Second Life as provided, without unauthorized software or other means of access or use" (Linden Lab, 2008). For this reason the use of a software agent was deemed inappropriate by the researcher and this line of investigation halted.

Further, subsequent to the investigation described, the following issues became apparent:

- Group size over time by itself cannot be used to predict the successfulness of another group, because the core purpose of a group has to be taken in to consideration.

- Identifying the core purpose of a group shows if there is a ‘time to live’ or ‘die by’ time. This is important in order to understand the growth/demise patterns of group size.

- Therefore, not only do groups need to be categorised by their core purpose/time to live but also only like for like should be measured with regards to predictability.

- There is no control over the mechanism used to return search results from Second Life. This lack of control over the mechanism to provide search results leaves the investigation/experiment at the mercy of possible changes carried out by a third party.

Finally, the progression of new-users technique as described was not complementary to the investigation as it revealed more about group joining rates rather than the actual groups themselves. Therefore the quantitative approach as described was not feasible for further study due to lack of control of Second Life mechanisms such as the metrics used to determine search results and the requirement to know the core purpose of a group before any kind of comparison or predictability could be ascertained.

## 3.3. Consumer satisfaction artefact

The core of this inquiry is the elicitation of consumer satisfaction levels and then the dissemination of this information for the benefit of vendors and consumers. However, the nature of this virtual world makes it distinct from real world and web-based interactions; consequently there is no straightforward way to implement established consumer satisfaction approaches. Therefore the design and implementation of an in-world consumer satisfaction artefact as a proof of concept was pursued.

As stated previously, in section 2.2, museums and galleries are a useful area to focus on as they encompass commercial as well as not-for-profit requirements (Gilmore and Rentschler, 2002). Also, they have a history of analysis for visitor requirements using accepted and experimental methodologies (Hood, 1993; Doering, 1999; Gilmore and Rentschler, 2002; Macdonald, 2005).

Typically, visitors to galleries or exhibitions can leave feedback of their experience via a visitors' book. Further, visitors' books can be seen as a form of "interactive exhibit in which many visitors participate (either by writing or reading)" (Macdonald, 2005). There is an implication from the quote by Macdonald which is that reading or writing in a visitors' book is an act of consumption at an exhibition. The process of leaving and consuming comments/ratings in visitors' books can be seen as a form of feedback. However, this process is arbitrary in the sense that only the issues that the visitor wants to rate or comment on are left, as opposed to the visitor commenting and/or rating on pre-planned questions or metrics. If a gallery or exhibition has an online presence then a mechanism can be incorporated similar in nature to a visitors' book so that comments or ratings can be left by visitors.

| | Real World | Web Based | Second Life |
|---|---|---|---|
| Feedback Device/Tool | Broadcast Media | Web based comments | SL Visitors' book |
| Reviewer | Expert reviewer | Expert reviewer<br>Individual consumer | Expert reviewer<br>Individual consumer |
| Example Scenario | TV, newspaper or magazine review | Expert and/or consumer reviews on Amazon or via a blog | Expert and/or consumer reviews left at a SL gallery |

*Table 2. Feedback conceptualisation.*

Table 2 is a conceptualisation of how feedback might be given and by whom. Here three environments are considered, the real-world, web based and Second Life. The 'Feedback Device/Tool' section pertains to the method used for dissemination of reviews. The 'Reviewer' row pertains to the typical reviewer and the 'Example Scenario' section shows typical instances of reviews.

The 'Real World' pertains to the physical world where we live, traditionally arts and cultural reviews or ratings through broadcast media are a one way communication from an expert reviewer. The 'Web Based' column is focused on web based documents as viewed from within a web browser. Web based reviews and/or ratings such as those left on Amazon enable individual customer or non-expert reviews/ratings to be left about a given product or service. The Second Life column pertains specifically to that virtual

environment and is in many ways similar to the web based column in so far as it allows for consumer generated reviews and/or ratings as well as expert generated ones. Second Life offers a number of ways to communicate between groups and individuals such as: instant messaging, voice or text chat and note cards, as well as a number of voting or opinion poll mechanisms.

With regard to creating a Second Life artefact based on a visitor's book, the intention was to provide a means of communication in Second Life between visitors and exhibitors as well as providing a discussion point for visitors. The criteria for the artefact were that it should be:

- adaptive to changes of the exhibit
- accessible for review over time
- personalisable to each participant that uses it

At the time of investigation, Second Life offered no such facility that the researcher could find. Therefore, the artefact as described here could facilitate a better user experience for both consumers and vendors within Second Life. The benefit of installing the artefact to the vendor is in gaining relevant feedback about their exhibition which can be used to inform future development. The benefit to visitors is in being able to share their thoughts of the experience they had as well as being able to see what others thought of the exhibition and therefore inform relevant discussion amongst interested parties. Further, greater user reviewing of products according to Chevalier and Mayzlin (2006) tends to lead to greater consumption of those products, thus a relationship benefiting both parties is formed.

Finally, Hood (1993) asserts that "studies have demonstrated that most of the things people object to in museums are related to amenities and services, or lack of them, rather than to the collections, exhibitions, or programmes". With this in mind, the artefact was to be used as a tool/device for rating the customer experience at a given exhibition and was not a mechanism to critique individual pieces or the ratings left by previous visitors.

### 3.3.1. Web based survey

Having explained the reasoning for using a visitor's book style of artefact within Second Life, the following section details the reasoning for implementing a web based survey as

part of the Second Life artefact. As Second Life functionality encompasses the use of a web browser, a web based survey could be used, with only a minimal interface/invitation object (the artefact) existing in Second Life, additionally the use of Likert scales in the survey would allow for the quantification of responses. Therefore a web based survey was designed following best practice guidelines, see Parsons (2007). The ten factors for measuring the total customer experience as described in Rowley (1999) systematically adopted to encompass the virtual world experience forms the basis of the survey. The ten factors are:

- speed of service delivery
- convenience
- age waves
- choice
- lifestyle
- discounting
- value adding
- customer service
- technology
- quality

The work by Rowley contextualises the ten factors within a museum environment, with the ten factors for appraising the customer experience originating from the work of Tucker (Tucker 1991a; 1991b). The survey was designed to encompass these factors from different perspectives and allowed respondents to answer only the questions they choose to for each factor. Applying differing questions based on each of the factors allowed participants to answer the survey based on their own perspective or experience.

Appendix 3 contains examples of the types of questions asked in real world museum surveys pertaining specifically to the customer experience. These British surveys are from the British Museum/HSBC money gallery exhibition (2001), a survey by the Lutz Children's Museum in Manchester (2009) and the Erewash Museum 'General Satisfaction Survey'(2007). The surveys cover a range of questions asking visitors to rate their levels of satisfaction with regards to their visit to the respective museums.

However, taking as a basis the metrics set out by Tucker (1991a; 1991b) to develop a survey within the context of exhibitions in the Second Life environment some adaptation was necessary, see Appendix 4 for the whole set of questions as well as a metrics translation. For example, 'speed of service delivery' is elaborated on by Rowley (1999) as: "For museums the emphasis is on access time. This will depend upon the access channel, telephone, personal visit or computer network. For personal visits access time will depend to some extent on location, and also on access to services within the

museum." To an extent these issues were seen in the Erewash survey in their probing of parking facilities as well as in the British Museum survey question (q.18) regarding directions. Speed of service delivery was translated into a virtual environment as access speed of the server on which the exhibition is located. The question asked considered lag (slow server reaction time) as experienced by the user. Lag is most often noticed in Second Life when avatars cluster at the same location.
Examples here were:

- I experienced lag while at the exhibit
- Second Life ran normally while I was at the exhibit

Another example is that of 'convenience', Rowley (1999) suggests "convenience is often closely associated with speed of delivery and, as with speed of delivery, location may be a significant factor in convenience. Convenience is also reflected in how well the service matches the requirements of the user, and will be influenced by opening times, range of services available from one service point and the extent to which specifically tailored services are offered for specific groups of users". Here the Lutz survey asked specifically about expectations being met while the Erewash survey probed issues about opening hours and access throughout the building. As content in Second Life is developed entirely by its users and some of these developers may prefer aesthetics to functionality, a problem can arise with ease of navigation such as circular staircases. The notion of convenience was translated to accessibility in terms of the layout of the exhibit.
Examples of this were:

- The exhibit was easy to move around
- I found the exhibit difficult to navigate through

As there are 10 factors that the questions in the survey were based on, Likert scales were used throughout the survey giving a numerical value to each response. A mean average was deemed to be an appropriate way for measuring ratings from these scores. Further, personalisation of responses can be achieved through dynamic adaption. This adaption was accomplished by a mandatory catch all question at the end of the survey which asked participants to rate the 10 factors in order of importance from 1 as unimportant to 5 as very important. This allowed participants to state the kind of things that were of importance to them personally. The numerical values from the answers given throughout the survey were then weighted in order of importance to the participant. Further detail can be found in Shukla et al. (2009a).

### 3.3.2. Second Life artefact

The mechanism delivering of the web based survey in-world was a Second Life artefact, see Shukla et al. (2009a/b) for further detail. This artefact needed to comprise the functionality of allowing visitors to an exhibition to participate in the survey and to review what previous visitors thought, independently of whether or not the visitor participated in the survey, see figure 7.

An overview of the scenario that the described artefact engaged in is as follows:

**A** makes an exhibition available.

**B** experiences the exhibition.

**B** creates a rating of the exhibition experience.

**B** disseminates the rating using an appropriate tool or device.

**A** can revise the exhibition in light of the ratings (now feedback) given.

**C** is a spectator at the exhibition and of the ratings.

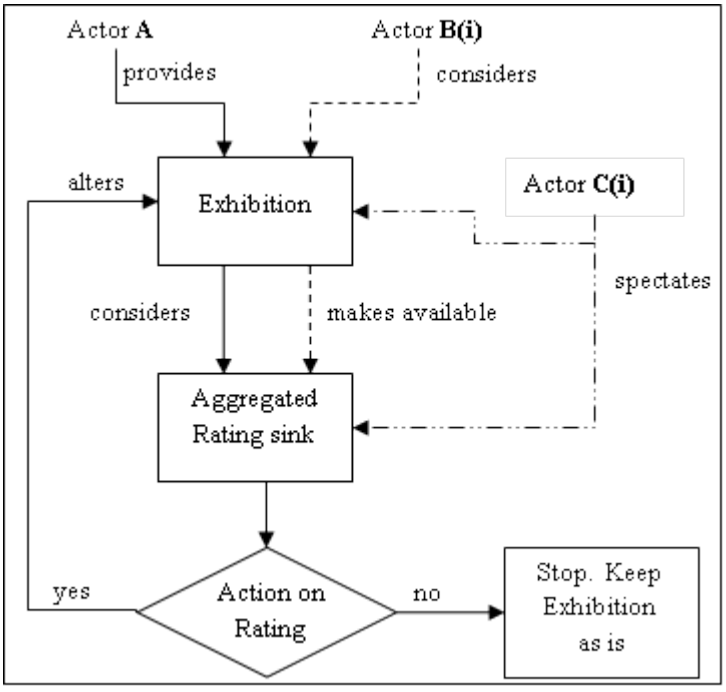


*Figure 7 Conceptual diagram of the scenario process.*

Essentially the artefact devised addressed a scenario where an actor **A** would own/curate an exhibition. Another actor **B** could then give a rating based on their own experience of

the exhibition. If actor **A** were to take heed of the type of ratings being given then actor **A** could refine the exhibition or develop a new exhibition with the rating in mind. In this instance, the rating becomes feedback when used by actor **A** or a learning object for actor **C** who attends the exhibition only.

Assumptions:

- **A** is the only exhibition owner/curator, as opposed to **A(i)**.
- **A** will consume the rating.
- **A** will act upon the rating.
- $\mathbf{i} \neq 0$.

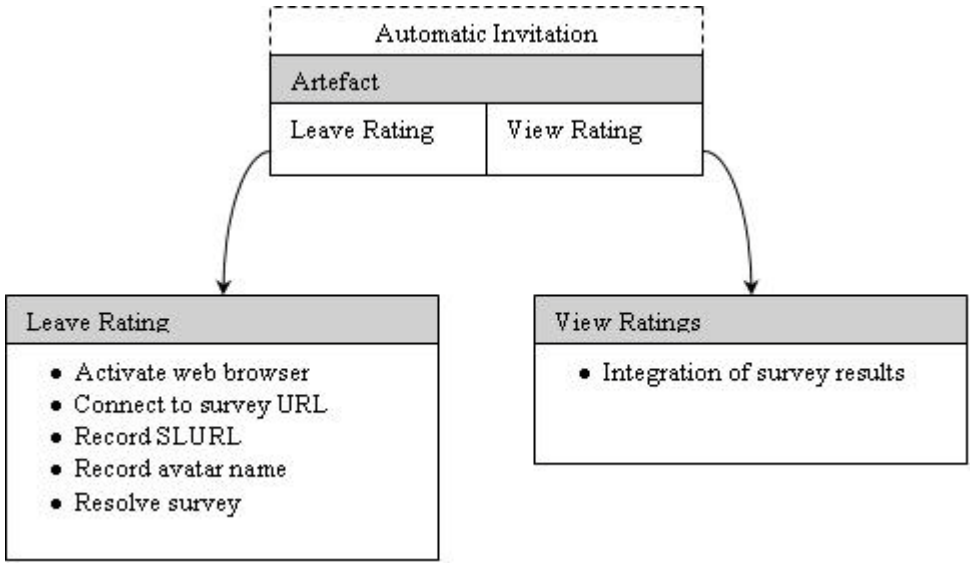


*Figure 8 Artefact overview.*

The artefact is a means by which persistent feedback/rating for an exhibition can be left, essentially transferring best practice from the 'real world' (Bessis et al. 2009), to a virtual world. An exhibitor makes the artefact available and visitors to that exhibition have a choice of whether or not to participate. Participation occurs by leaving and/or viewing the ratings for that exhibition. Figure 8 shows the sequence of events available to a visitor wishing to participate in either the leaving and/or viewing roles.

The location of the artefact is problematic because unlike in the real world a visitor to a

gallery or exhibition within Second Life can choose to 'teleport' away (instantly changing locations in-world) and therefore the positioning of the artefact near an entrance does not mean that visitor traffic will necessarily pass by it. This problem can be mitigated by an invitation to participate being triggered by the visitors departure from the exhibition location if they have not already participated. If a visitor to an exhibition wanted to participate then the web based survey would be activated. The Second Life interface allows for users to specify if they want to use their own web-browser or the integrated Second Life web browser.

Second Life has its own scripting language Linden Scripting Language (LSL), therefore the script written to activate the web-browser could also embed the Second Life URL (SLURL) as well as the avatar name of the participant. The recording of the SLURL would necessitate the need for just one survey database to be required for multiple artefacts. In this way many instances of the artefact can be deployed at various locations throughout Second Life simultaneously. Recording the avatar name of the participant can help identify false ratings being left, for example by a jealous competitor who may wish to leave multiple 'bad' ratings. It should be noted that this approach is merely deterrent to misuse of the artefact. A database check to see if the avatar name is recorded as leaving a rating before at an exhibition also allows that visitor to leave a new rating, for example, after an exhibition has been updated. In this instance the prior rating left by the visitor is removed and the new one is incorporated. The code for the web based database and the in-world artefact can be found in Appendix 5.

### 3.3.3. Artefact – concluding remarks

An experience-feedback artefact was developed based on the Rowley approach for the survey. The vehicle for the artefact was a web based survey, using a three tier architecture (essentially a client-server architecture where presentation, logic and data are separated), connected to a Second Life artefact which was built in-world using the tools and scripting capabilities available therein.

The implementation of the survey required the need to ascertain appropriate three-tier architecture and hosting service. Further, the survey needed to be constructed and appropriate code written to transfer data to and from a back-end database. Coding was

also required to weight the scores from Likert scale responses to the preferences of each participant.

Both the Second Life artefact and the web based survey had specific requirements with regard to functionality and were therefore created as no 'off the shelf' products were found that met the requirements for this investigation. The way that data from the survey could be used by the Second Life artefact is described in Shukla et al. (2009b) and is essentially the weighted responses of participants, see Appendix 6.

Both the survey and the artefact have been tested for the correct import and export of data to each other. Initial user testing highlighted issues to the approach being taken and further survey and technical development of the artefact resolved these issues.

Essentially the hypothesis that a total customer experience approach to surveys for eliciting consumer satisfaction metrics in Second Life was achieved. However, this quantitative approach was ultimately not pursued as the researcher felt that a greater depth of understanding and flexibility of questioning could be gained from qualitative approaches as described in Chapter 5.

## 3.4 Conclusion

In the introductory chapter here, the over-arching question of this research study was specified as: how can we better understand another party when using virtual worlds as the mediating platform and using consumer satisfaction as an example of complex communication? This was then narrowed to the central question of this research study as being: in what way does the communication process differ in the real world to that which is conducted in computer mediated environments? While the aim here was shown as: how to identify the elicitation of consumer behaviour, focussed on consumer satisfaction, within the context of a multi-user, computer mediated, immersive environment.

On reflection, early experimentation was conducted along one of two general strands of inquiry. The first strand was essentially an exploration of a quantitative approach to 'Groups', while the second strand was concerned with the creation and implementation of an in-world consumer satisfaction artefact which used an external online persistence-of-data mechanism.

Although neither strand was explored beyond the stage at which they are described here, both of the strands informed the approach taken to, and the implementation of, the elicitation of consumer satisfaction framework as described in the following chapters. For example the total customer experience approach as used for the in-world artefact was also the basis for the semi-structured interviews as described in Chapter 5. However, it was believed by the researcher that by taking a quantitative approach with the use of semi-structured interviews and thematic analysis rather than using a survey greater detail from the participant could be sought.

In summary this Chapter has detailed the initial experimentation conducted by the researcher. Further, the rationale, results and criticisms of the experiments have been given. Ultimately this initial experimentation was the basis from which the framework as evaluated in Chapters 4 and 5 was created.

# 4 Framework description

As seen in the previous sections the real world experience needs to be taken into account, along with social factors, when considering the virtual world experience. The following is a description of the conceptual framework and the components therein, the initial approach of which is shown in figure 9. This initial approach showed hedonic and utilitarian value found in the use of Second Life as directly connected to cognition and emotion. Further that the environment one was in during their Second Life experience had an over-arching impact upon the experience. Further, this initial approach separated cognition and emotion as two distinct mental processes with utility and hedonic values as specific consequences of those processes. What became apparent, as described in sections 4.3 and 4.4, was that this perspective of cognition and emotion was an over-simplification and therefore the framework should be further developed in order to reflect this.

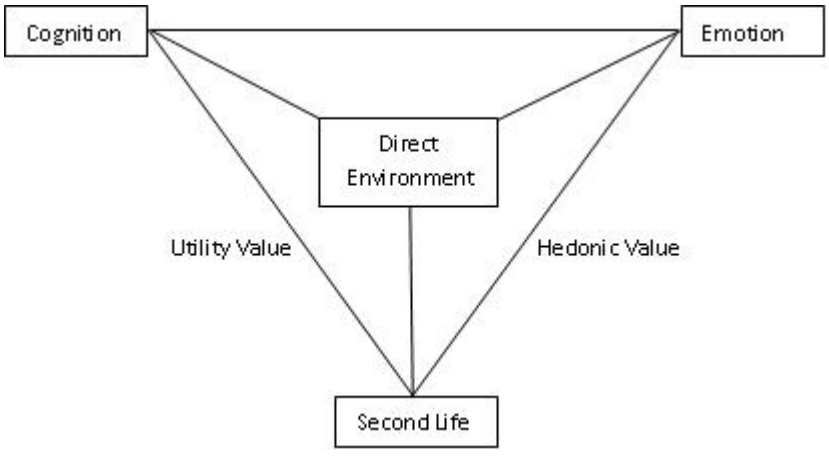


*Figure 9 The initial approach to the framework.*

The framework described here has evolved from research by the author on eliciting consumer satisfaction in the Second Life environment (Shukla et al. 2009 a/b) as well as from the related literature. This previous research focussed on the elicitation of consumer satisfaction in arts and cultural exhibitions within Second Life. Exhibitions of this nature

were chosen as these types of organisations encompass not-for-profit as well as profit-seeking ventures and the variety of organisational structures that underlie them. Further, the previous research predominantly took the perspective of elicitation, using self-report, in terms of total customer experience, as per Rowley (1999).

However accepting the conclusions by Giese and Cote (2002) as described previously in section 2.1, that consumer satisfaction is a mental state occurring in response to an expectation or experience and which has a distinct temporal aspect to its occurrence. What needs to be considered then is the nature of the factors that contribute to that state of mind, as well as how Second Life environments can best be tailored to encourage that state in a favourable sense. With this in mind a framework for this purpose has been developed, see figure 10. This framework was the basis upon which testing was undertaken with a view to further refinement as a consequence of the primary data gathered. Reflection on the embodied experience of the researcher was taken as the starting point in the creation of this framework. Reflective practice in this sense is based upon what Boud et al.(1984) stated as "a generic term for those intellectual and affective activities in which individuals engage to explore their experiences in order to lead to new understandings and appreciation". Essentially this reflection is exemplified here with the answers gained from self-questioning:

**What am I experiencing?**

Thoughts and feelings, sensations in and upon my body. My focus is in-world but I am still aware of the office I am in and the sun shining in through windows. The water stained paintwork on the wall beyond my monitor keeps drawing my attention.

**How am I experiencing it?**

Thinking and feeling is internal but outside influences often contribute or drive this internal state. I am using an internet connected computer setup to gain access to Second Life. Navigation in-world is almost automatic to me now.

**Where am I experiencing this?**

My office is in a University located in Luton, Bedfordshire, UK, Earth. My attention is in-world via a computer setup. Second Life is in front of me but I also know a lot of it is based on servers elsewhere in the world.

This reflection led to the evolution of the framework from that in figure 9 to that in figure 10. Primarily this change situated the user experience as both physical and mental simultaneously. The following illustrates how this reflection was the basis upon which the framework was further developed:

**What am I experiencing?**

| | | |
|---|---|---|
| Thoughts and feelings, sensations in and upon my body. | Led to ----> | User experience situated in Direct environment. |
| My focus is in-world but I am still aware of the office I am in and the sun shining in through windows. | Led to ----> | Similar to the above but note that there is an addition of external factors which should be included. |
| The water stained paintwork on the wall beyond my monitor keeps drawing my attention. | Led to ----> | Environmental factors can affect the thought process. |

**How am I experiencing it?**

| | | |
|---|---|---|
| Thinking and feeling is internal but outside influences often contribute or drive this internal state. | Led to ----> | Similar to above but acknowledging that internal states can be affected by physiology also. |
| I am using an internet connected computer setup to gain access to Second Life. | Led to ----> | Many technologies enable this experience. Where is my focus? |
| Navigation in-world is almost automatic to me now. | Led to ----> | A learned skill but how about how straightforward others find it? |

**Where am I experiencing this?**

| | | |
|---|---|---|
| My office is in a University located in Luton, Bedfordshire, UK, Earth. | Led to ----> | Where am 'I'? Is the answer where my body is or where my focus is? |
| My attention is in-world via a computer setup. | Led to ----> | Similar to above. Also, to what extent can 'I' be affected in-world encounters with others? |
| Second Life is in front of me but I also know a lot of it is based on servers elsewhere in the world. | Led to ----> | Where is Second Life situated? By extension, where is my experience of Second Life occurring? |

The porous lines shown in figure 10 denote that the elements being divided by the line can both affect and be affected by the element on the other side of the line. Further, the Broad Environment, User Experience, Interaction and Internet elements were included into the framework after the reflective process described.

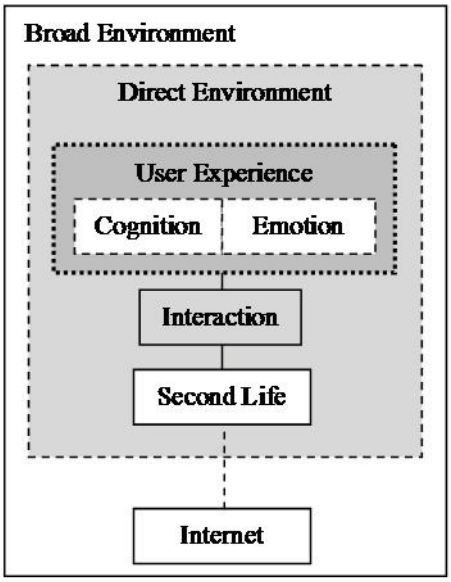


*Figure 10 The eliciting consumer satisfaction in Second Life framework.*

The description of the exercise conducted in the creation of this framework underlined, for the researcher, two consequences to the 'holistic' approach taken by the framework as shown in figure 10.

One consequence was that by taking a 'holistic' approach, the framework encompassed other theories used for investigating online user experiences. For example, the concept of 'Flow' as originated by Csíkszentmihályi (1990) has been widely adopted by online community and computer games designers (Kim, 2011). Specifically, the findings by Csíkszentmihályi are used in this context as a guide to balancing the skill a user (or player) has against a challenge they face. As the skill a user has increases over time, the challenge they face needs to be appropriately increased (ibid.). Indeed, this is much the same approach taken by Linden Lab when they released their Viewer 2, see section 1.4.

The other consequence was the rejection of a Cartesian dualistic world-view (Ess, 2011, 2010) of the human experience with regard to online experiences in favour of an embodiment perspective. Essentially the Cartesian dualistic world-view is one where mind and matter (or body) are distinctly separate (Ess, 2010). Whereas the concept of embodiment, as described in Chapter 1, takes the stance of emphasising that the brain (and by extension the mind) has sensory and motor-control function of the body which is necessary to negotiate useful interactions within the environment. However the issue here is, how this concept translates when the 'negotiated interactions and environment'

stated by Wilson (2002) are by means of a virtual world. Here we can turn to what Biocca (1993) refers to as 'progressive embodiment', which is defined as "the steadily advancing immersion of sensorimotor channels to computer interfaces through a tighter and more pervasive coupling of the body to interface sensors and displays". Gerhard et al. (2004) clarified this issue as "the virtual body can be considered as merely an extension of the physical body and that the virtual body is a representational medium of the mind and the fundamental communication hardware in a virtual environment".

The conceptual starting point of the framework was the user along with the mental processes that affect their choice of, and experiences within, Second Life. The environment that the user is accessing Second Life from was then taken into consideration as being an influential factor on the accessing and experiencing of Second Life. Next, the functionality of Second Life needed to be taken into account as experiencing Second Life requires an internet-connected computer. Finally, factors that impact upon but are tangential to, the user in this situation were acknowledged.

All of these factors are described by the interrelated components of the framework, which are:

- The broad environment
- The direct environment
- The user experience
- Cognition and emotion during the user experience
- Interaction with and within Second Life
- Second Life
- The Internet

A discussion of these components in the context of Second Life as a product and as a platform follows.

## 4.1. The broad environment

The broad environment as shown in figure 10 is indicative of the 'outside world' and is primarily to take into account the impact on the user of socio-economic, political and geographic factors. An example here is that of legislation that applies to Intellectual

Property Rights (IPR). Further, the broad environment is used here to also be indicative of influences such as religious, cultural, familial and peer bonds. These external factors impact on the state of mind of a user and can be perceived as the external world having a direct and indirect bearing on their satisfaction whilst operating within Second Life.

## 4.2. The direct environment

The direct environment here can be understood as the environment that the user is in while operating a computer running Second Life. Essentially this is the user's location, which needs to be considered as this location impacts (Elliot, 2007 a/b) on the user's experience of Second Life.

The direct environment that the user is in while conducting their foray into Second Life needs also to be considered with regard to whether or not that environment is a public or private space. Further, consideration should be given to whether the space is one which is being shared with others and if so, for what purpose. For example, a friend sharing a bottle of wine while watching the user navigate an art exhibition will have an entirely different impact on the user and their state of mind and possibly their level of satisfaction of a given Second Life environment than if the same user was at their office desk during their lunch hour in a busy open plan office. Essentially then, the direct environment component of the framework encompasses not only the physical makeup of the location the user is situated but also the nature and purpose of the environment as well as who else is present in it.

## 4.3. The user experience

The role that identity as well as utilitarian and hedonic values or opportunities play in the use of Second Life also need to be investigated. Here the utilitarian or functional value can be seen in aspects of Second Life such as the ability to create objects/structures using the in-world building tools as well as opportunities such as group meetings for those that are geographically dispersed or even the navigability through the 3D space of Second Life. Hirschman and Holbrook (1982, p. 92) define hedonic as "those facets of consumer behaviour that relate to the multi-sensory, fantasy and emotive aspects of one's

experience". Second Life has many opportunities that allow the user to have such experiences which include issues around escapism, entertainment**,** identity, avatar creation and modification as well as gender and ethnicity roles, role-play and social masks – in so far as there are layers of separation between the user and any co-respondent.

Sheeks and Birchmeier (2007) wrote about how this kind of computer mediated communication and separation enables those with visible disfigurement or deformation or other 'normal' social interaction draw-back such as eye aversion, stammer or social anxiety to communicate their 'true-self'. Their assertion being that the separation involved in computer mediated communication allows for various social interaction gating (who and how we choose to interact) to be mitigated. Other factors that play a role in social gating are age, ethnicity, gender and such like. Interestingly the term 'avatar' originates from the Sanskrit 'avatara' in Hindu mythology where it was used to describe the representation of an aspect of the Divine (Ahn et al. 2012). An avatar in Second Life therefore can be perceived as a representation or aspect of the true-self of the user operating the avatar. In a similar vein Papacharissi (2011) spoke about identity as performance, at its most basic level this is how we change our behaviour depending upon the circumstances, environment and company that we have. This raises issues regarding identity as projected and as perceived and with the sense of self as reflexive or liquid in nature.

## 4.4. Cognition and emotion

The framework shows how the user experience of consumer satisfaction within Second Life is perceived. Cognition here is the rational thought process, for example making a product choice based on price. However, matters become more complicated as product or service selection can be perceived not just as a matter of cost but rather of value, with value perceptions often being tied in with notions of quality and reputation that are often implicit with brand recognition. The dynamic link between cognition and emotion is well known, if not well understood (Gratch et al. 2009; Niedenthal, 2007; Clore, 2009; Jenkinson, 2007). The following hypothetical scenario exemplifies this: having just had a blazing row with their spouse, a user may be unlikely to report an excellent sense of satisfaction, as the user's general state of mind is likely to be still affected by the conflict. Alternatively, the user may, after said argument, have an overly positive sense of their

experience, as immersion into Second Life is being used as an escapist or diversionary tactic.

Further there are physiological factors that can impact upon the level of perceived satisfaction of a user at any given time. These factors include chemical and hormonal imbalances that may be caused by illness, drug usage or poor diet amongst other reasons. Emotion, then, in this framework is the feeling state or affect (Cohen et al. 2008) that a user is experiencing whether or not they are aware of it.

Elicitation of emotional state with regards to consumer satisfaction preference is somewhat more problematic than the total customer experience approach taken previously. Autonomic measurements such as those gained via, for example, the Facial Action Coding System, Electroencephalography or Functional Magnetic Resonance Imaging (Sörensen, 2008) offer immediate measurement of the subject while they are experiencing an emotional state. However there are drawbacks to these approaches, such as interpretation of data, having an experienced tester on staff or the necessity for the subject to be in a laboratory environment during measurement.

Self-report of emotional states is often used in academic as well as marketing research (Sörensen, 2008). The issue here is that the actual emotional state is not being measured, rather it is the user's self-report of their perceived state that is reported. This consideration is acceptable depending on the reason behind a given research study (Sörensen, 2008) and models have been developed to pursue this type of investigation. Examples of this approach are Mehrabien and Russell's pleasure, arousal, dominance model (1974) or Richins' consumer emotions set (1997).

Also it should be recognised that typically consumer satisfaction in marketing is measured in terms of 'positive feelings'. This research, however, is more concerned with the impact of feelings (often referred to as arousal in the literature) both 'positive' and 'negative', as certain exhibitions may be highly impactful as an experience but have a 'negative' nature such as the 'Suicide Museum' or the 'Holocaust Memorial Museum' exhibitions within Second Life.

## 4.5. Interaction

Social interaction plays an important part of the Second Life experience. Second Life has

a group mechanism built into it that plays a central role in structuring the various social activities that can be performed by avatars in Second Life. As previously described in section 3.2, a user can join a group either for free or for a joining fee by invitation, private application or public application.

Further, as described in section 1.4.1, a number of in-world technologies exist that enable a user to communicate with others. Interaction, then, can occur in a number of different ways depending upon how the user is using the technologies available with Second Life. Further, it is of interest here as to how users interact as well as why they choose to do so using this particular product.

## 4.6. Second Life

The internal economy of Second Life is based on a real-world equivalency rate and allows users to exchange their money into or out from Second Life. One important point here is that in-world monetary transactions can only be enacted using the supplied mechanism. Second Life then, as the name suggests, is a mediated extension of our world to the extent that people interact with one another and go about pursuing their interests. For these reasons we can consider that the Second Life element of the framework to also have a direct and broad environment. In as far as the direct Second Life environment is the specific location of an avatar and the broad environment is composed of socio-economic factors and such like that can impact user experience but is not something necessarily in their control.

The idea of *place* is a difficult concept to define (Gration et al. 2008), however, a good starting point would be "Place = Space + Meaning" (Harrison as cited in Gration et al. 2008, p. 2). The distinction made here is that between the direct environment that the user is physically in and that of the virtual space that the user is focussed upon and navigating via their avatar. Harrison calls this a complex form of hybrid space and clarifies this concept as:

> A hybrid space is one which comprises both physical and virtual space, and in action is framed simultaneously by the physical space, the virtual space and the relationship between the two. (Harrison and Dourish, 1996, p. 6)

This distinction between the real and virtual space becomes less clearly distinguished when we take into account that the mediated experience of immersive environments can have a strong psychological impact.

Waterworth and Waterworth explain it thus:

> When we experience strong mediated presence, our experience is that the technology has become part of the self, and the mediated reality part of the other. When this happens, there is no conscious effort of access to information, nor effort of action to overt responses. We can perceive and act directly, as if unmediated. (2008, p. 61)

Therefore, the Second Life direct environment is important to consider due to the opportunities offered for the customisation of content. Further, the 'place' that the avatar is located in at any given time also needs to be taken into account as it can affect the user experience in terms of their cognition/emotion. Essentially this is the immersive component at work, here distinguishing between sensorial and psychological immersion. With Second Life sensory immersion is primarily via the audio and visual modalities. The psychological immersive aspect of Second Life is similar to that experienced watching a film in so far as a certain level of suspension of disbelief is required. Moreover, communicating either synchronously or asynchronously with others elevates the experience to an involved interactivity that film cannot, as yet, achieve. Indeed, relationships are formed with other avatars and these have essentially the same impact, both positive and negative, that relationships have in the normal day-to-day world.

## 4.7. The Internet

Second Life uses a client-server architecture which operates on internet technology, for example, the client-server communication is achieved through the use of the User Datagram Protocol (UDP). As the client-server architecture of Second Life operates as a layer upon existing Internet technologies, it is prone to similar failings, the prime example being that of network lag. Network lag typically occurs when there is high usage or a technical failure on the part of the Internet infrastructure between Second Life servers and the user client and is seen in-world as a slowdown or failure of in-world mechanics.

When using Second Life, the use of Internet technologies is not confined to client server

data exchange. Scripted objects using LSL can operate outside of Second Life using HTTP, XML-RPC[16] and even email. The Second Life modified Mozilla web browser allows access to web-based content from in-world. This feature was one of the main areas of improvement when Viewer 2 was developed.

Second Life allows the use of Apple's QuickTime[17] supported streaming media in-world. All Second Life Viewers have streamed media playback preference settings. The Second Life interface, also known as a Viewer enables communication and interaction in-world, for example the capability for 'web on a prim'. The idea is that web-based media can be assigned as a texture onto a prim, which now makes it much easier for web-based content such as YouTube videos or SlideShare presentations to be made available in-world.

Finally, not only are web-based services used to bring content into Second Life, there are instances of Second Life created content being used as media on the web. For example, Linden Lab have a Second Life channel on YouTube, the content there is mostly educational in the use of Second Life or promotional in terms of new features or functionality.

However there is also a trend in what is known as machinima, which is the recording of in-world events in the form of an animation and many examples of this can be found on video sharing sites. Indeed Second Life produced machinima has been shown at film festivals and on television, for example 'Molotov Alva and His Search for the Creator: A Second Life Odyssey' by Douglas Gayeton[18].

Having discussed the various facets that make up the framework, consideration needs to be made of the approach taken to testing it. Chapter 5 is a discussion of the results gained from interviews that were conducted in-world. The foci for the interviews were developed from the previous research on total customer experience and elaborated using the current framework.

[16] This service however is 'deprecated', see http://wiki.secondlife.com/wiki/Category:LSL_XML-RPC
[17] http://www.apple.com/quicktime/
[18] See: http://www.youtube.com/watch?v=-e716rQAdXw

# 5 Framework experimentation

This Chapter describes how data was collected and interpreted using the framework described in the previous Chapter. A description of the methodology for conducting the in-world interviews is given, followed by explanation and interpretation of the data gathered.

Prior to the main body of this section it is necessary to contextualise the main methodological approach taken here. Although the term Grounded Theory is a popular approach in the qualitative literature, there are actually two distinct approaches of Grounded Theory, namely Glasarian and Straussian. Therefore some clarification in the use of this methodology and indeed the term Grounded Theory within this research study is appropriate for discussion.

Initially Glaser and Strauss developed and, in 1967, published the original account of Grounded Theory in 'The Discovery of Grounded Theory'. The approach taken in Grounded Theory is for a researcher, 'without preconception', to become immersed in the data of a study, analyse the data and formulate theory based on that analysis. This approach of a researcher grounding themselves in the data before theory specification was perceived as offering a valid alternative to the hypothetico-deductive method as explained in Birks and Mills (2010). The phrase 'without preconception' is used to mean a researcher would not have a detailed knowledge of the literature regarding the area of study, neither would they have a predetermined theoretical framework in mind.

However, the immersion into data without preconception was problematic for some researchers who wanted to pursue this approach. For example, one might find it difficult to secure funding for a research project if the initial bid document stated that essentially the researcher would decide on the theoretical issues involved after a good deal of time and funding were spent analysing data. Strauss, with Corbin, went on to develop a variation of the original Grounded Theory as published in 'Basics of qualitative research: Grounded theory procedures and techniques' in 1990. This variation although still named

Grounded Theory did not require that a researcher should enter into immersion in the data without preconception. Therefore, in what is now termed as Glasarian Grounded Theory, which is in essence close to the original Grounded Theory but developed further by Glaser, a researcher should enter data gathering and analysis without preconception. With Straussian Grounded Theory, however, the notion of preconception is deemed an entirely valid approach to take. Also, Straussian Grounded Theory accepts that this preconception can include a theoretical structure which, in essence, then uses the data analysis findings to underpin the given theoretical structure, or indeed, refute it depending on the given findings.

Thus, based on the prior discussion, Grounded Theory can be perceived as having the aim to explore social processes and to understand the multiplicity of interactions that produces variation in those processes as asserted by Heath and Cowley (2004). Therefore Straussian Grounded Theory was chosen as the appropriate methodology to use in this part of the research study.

Additionally, quantitative elements as a secondary approach were also sought for further verification of the primary qualitative approach taken. Given the experience gained in using a quantitative approach as the primary method, as described in Chapter 3, the quantitative approach here was a form of 'triangulation' which is an approach also used in Chapter 6. Cohen et al. (2005) explain the use of triangulation as:

> In its original and literal sense, triangulation is a technique of physical measurement: maritime navigators, military strategists and surveyors, for example, use (or used to use) several locational markers in their endeavours to pinpoint a single spot or objective. By analogy, triangular techniques in the social sciences attempt to map out, or explain more fully, the richness and complexity of human behaviour by studying it from more than one standpoint and, in so doing, by making use of both quantitative and qualitative data. Triangulation is a powerful way of demonstrating concurrent validity, particularly in qualitative research.
>
> (Cohen et al., 2005, P.112)

Further, the use of triangulation can offer more than verification, it can also enrich the overall findings from a given piece of research, as alluded to in the quote by Cohen et al. (2005). On this point, with regard to the use of triangulation for enriching the

understanding of data, Jick (1979) points out:

> It can also capture a more complete, holistic, and contextual portrayal of the unit(s) under study. That is, beyond the analysis of overlapping variance, the use of multiple measures may also uncover some unique variance which otherwise may have been neglected by single methods. It is here that qualitative methods, in particular, can play an especially prominent role by eliciting data and suggesting conclusions to which other methods would be blind. Elements of the context are illuminated. In this sense, triangulation may be used not only to examine the same phenomenon from multiple perspectives but also to enrich our understanding by allowing for new or deeper dimensions to emerge.
>
> (Jick, 1979, p.603)

Therefore the overall approach taken here, as suggested by Bazeley (2009), in the interpretation of the data is one of "describe, compare, relate". The concept here is that the interpretation of emergent themes in a Grounded Theory approach can be made all the richer by including a comparison and/or relationship to other emergent themes in addition to a description of a given emergent theme. The use of quantitative elements in addition to the qualitative enabled this to be carried out.

## 5.1. Framework investigation

With the issues explained in section 3.2, the chosen approach was essentially techniques 11 and 13 as a series of semi-structured interviews which were conducted in-world. Further, these were either as one-to-one or as group interviews. This choice was made on the basis that it would generate the richest results, in terms of understanding the consumer perspective, without the need for speciality equipment or staff. All interviewees freely volunteered their time to participate. Interviewees were recruited in-world at the 'University of Bedfordshire' and the 'London Hyde Park' locations. The latter location was chosen as it is a popular destination for a wide variety (age, geographic location, etc.) of Second Life users and was initially found by the researcher during earlier investigation, see section 3.2.3. The former location was used as a 'base-camp' by the researcher and on more than one occasion an interviewee asked to see the Second Life presence of the University during the interview pre-amble. It should be noted that the interviewees were here perceived as consumers of the location they were interviewed in

and also as consumers of Second Life. All locations within Second Life need to be constructed and have ongoing costs associated with their ownership, see section 6.4 for further details about issues which can arise when Second Life locations are not cost effective. Therefore we can perceive both the location and Second Life as products whose consumers will be interviewed to elicit their consumer satisfaction. Additionally interviewees can be queried as to their specific likes and dislikes of other locations, thereby generating valuable business intelligence overall.

Before the interviews began, interviewees were made aware of the nature and purpose of the study being conducted. Further, interviewees were made aware of ethical and privacy issues and how they would be dealt with. In particular, it was made clear that at no stage should the interviewee feel they had to answer any question or questions if they felt in any way uncomfortable about doing so.

Also, it should be noted that real world identity or demographic positioning types of question were not included. However, in the event that information of this nature was volunteered by the participant, then follow-up questions would be made as required. The approach taken was to read statements made about real world identity and/or demographic positioning in terms of the interrelated components of the framework. This approach mitigated issues arising from role-play, privacy and social acceptance whereby participants might not want to truthfully reveal themselves.

The interviews were predominantly conducted in text chat although the use of the in-world voice chat system was used on occasion; when this was the case a transcription was made. It was felt that keeping to the mode of communication that was preferred by the interviewee would make the experience more comfortable for them to participate in. Further, the researcher was aware that one interviewee has English as a second language. Interviewees were asked a variety of questions about their Second Life usage, experiences and preferences. The interviews took a semi-structured approach insofar as a prompt sheet was used by the interviewer as a reference to keep conversations from straying too far off topic. These prompts were used not only as a basic structure for the interview but to also aid elaboration on a given point. Further, the prompts were derived from the earlier work on the web based survey, see section 3.3.1.

The following list of prompts shows the approach taken:

- How long have you been using Second Life?
- How many avatars do you have?
    - If you have more than one, do your avatars have different characters?
    - Is your avatar like the real you?
- What kinds of things, both positive and negative, affect your experience of Second Life?
    - How do you deal with that? / How do you feel about that?
- What things are important to your use of Second Life?
- How do you see yourself in Second Life?
- Do you have friends in Second Life that you know in real life?
- Where is your favourite place in Second Life
    - What makes it so?
- Where do you normally access Second Life from?
- How much time do you think you spend in Second Life?
- Which viewer are you using?
- How do you finance your Second Life purchases?
    - What was the last thing you bought in Second Life?
    - Can you elaborate on why/where/what made you buy that?

Chat logs and transcriptions from the interviews were used as the basis for thematic/content analysis, see Appendix 7. This was undertaken using an analytico-synthetic approach (Lambe, 2007), by extracting the interviewee responses from the chat logs to construct response units. This is essentially the deconstruction of material into component parts and re-construction in a similar way to how 'conceptualising the abstract' is conducted in Grounded Theory (Strauss and Corbin, 1998). The response units were constructed either from standalone responses or from fragment responses. With fragmented responses, where a response was separated over a number of chat lines, the response was re-assembled into a single unit. In all, the 10 interviewees produced 189 response units each of which were aligned with the framework components. The identified emergent themes, their frequencies and the number of responses for each of the framework components can be seen in Table 3. A Straussian Grounded Theory approach (Strauss and Corbin, 1998) was taken here whereby response units were read in light of a component area and an inductive process of identifying themes and coding was undertaken. This was an iterative process with frequent revisiting of component areas for

re-reading and possible re-coding in light of an emergent theme in another component area. Thus the Straussian Grounded Theory stages of data analysis coding, namely: open, axial and selective were met.

Adjustments were made as necessary to the framework components mainly due to further readings in the literature such as Binge (2008) and Lehdonvirta (2009). Specifically, the user experience component as discussed in section 4.3 was sub-divided into hedonic, utilitarian and identity statement groupings, all three of which were then treated as individual components in the framework. A process of theoretical (deductive) thematic analysis (Braun and Clark, 2006) was then performed for each of the component areas.

The percentages shown in table 3 in the Responses column refer to the percentage of the 189 response units. Further, table 3 shows Responses as the number of response units that related to a framework component. Emergent themes are shown with the frequency with which they appeared. Examples for each of the framework components follow, with selected extracts from the 189 response units. The comments made by the interviewees are given here verbatim and presented as close to the original structure as possible. Two abbreviations often used are *sl* for Second Life and *rl* for real-life. Further, the final example shown, towards the end of this section, is in relation to how interviewees adapted their communication to make use of the medium.

The coding of response statements during thematic analysis was determined by the context of the discussion and the researcher's understanding of the 'feel' of the narrative flow. Response units were often coded with multiple themes in a given framework component area. A single response unit could have multiple themes applied to it in a single framework component area. Further, a single theme occasionally would be applied to a single response unit in a single component area. This situation arose only when a response unit made multiple references to the theme in question.

The explanations given in sections 5.1.01-10 for the coding of response units often detail, towards the end of each coding explanation, other codes from the same and/or other component areas that were given to response units of a given code. Further, at the end of each section (figures 11-20) a chart is given showing the amount of

response units coded in other component areas which matched response units coded in the given component area being detailed.

Finally, each code explanation is accompanied with at least one example response unit which is differentiated from the main text by being in italic. All of these examples are also indented and preceded by a bullet point. It should also be noted that there are instances of non-italicised text within square brackets among the italicised example response units. Initially these were put in place by the researcher with response units during the thematic analysis process as an aid to contextualise or understand the response unit without needing to refer back to the original chat log. As such an aid they now remain in place for the reader.

| Component | Responses | Themes (frequencies) |
|---|---|---|
| Broad | 45 (24%) | peers (15), geography (8), cultural (7), economic (work) (4), economic (2), infrastructure (2), technological (2), pastimes (2), family (1), production (1), purchase (1) |
| Direct | 18 (10%) | accessories (6), natural (4), employment (3), comparative (2), finances (2), technology (1) |
| Hedonic | 28 (15%) | taste (14), entertainment (4), exploration (4), aversion (2), desire (2), satisfaction (1), mask (1) |
| Utility | 12 (6%) | functionality (3), rationalising (3), opportunity (2), employment (1), knowledge (1), cost (1), finances (1) |
| Identity | 52 (28%) | perception (15), avatar (8), differentiation (8), personality (7), role-play (7), social (3), physical (3), taste (1) |
| Cognition | 60 (32%) | timeframe (19), query (11), deduction (9), summation (8), identification (5), intent (4), interpretation (3), self-determination (1) |
| Emotion | 14 (7%) | contempt (5), fear (3), pleasure (2), closeness (1), disappointment (1), humour (1), appreciative (1) |
| Interaction | 48 (25%) | meeting (9), judgement (6), pastime (6), real-life (5), co-operation (4), frequency (4), lack (3), demands (3), undesired (2), gifting (2), network (2), trepidation (1), uncertainty (1) |
| Second Life | 116 (61%) | usage (23), distinction (22), interface (16), locations (14), financial (13), content (12), relations (8), searching (6), entertainment (2) |
| Internet | 16 (8%) | streaming (7), applications (6), availability (3) |

*Table 3. Framework components, response rates and identified themes.*

### 5.1.01. The broad environment

For the **broad environment**, 45 response units related to this component which is 24% of all the response units. The broad environment relates to issues of the 'outside world' and the influences that affect us from there. Eleven emergent themes within this component area were identified from the interviews. Table 4 shows the emergent theme names as well as their frequency of occurrence during the thematic analysis of the interviews.

| Theme | Frequency |
|---|---|
| Peers | 15 |
| Geography | 8 |
| Cultural | 7 |
| Economic (work) | 4 |
| Economic | 2 |
| Infrastructure | 2 |
| Technological | 2 |
| Pastimes | 2 |
| Family | 1 |
| Production | 1 |
| Purchase | 1 |

*Table 4. Emergent themes and frequencies in the broad environment component.*

**Broad: Peers**

There were 15 instances of response units that were coded as 'peers' discussing friends, acquaintances and such like. Relationships with the people discussed could be tight such as with a boyfriend or looser such as that between a student and their classmates. Of interest here is that the majority of response units that were coded with the peers theme related to small numbers of people except for one. The response unit which related to a larger number is shown with the example texts for this theme and can be perceived here as the respondent leveraging what Granovetter (1983) called the strength of weak ties, this is in contrast to Dunbar's (2010) notion of optimal group size of around 120-220.

Example texts of response units that were allocated to this theme are:

- *my friends... i know it's sl, but i've become as close to some of them as some*

*friends in rl silly i know =P*

- *i do only two but they live in france so its easier to talk in the game*
- *I have been using SL for 2 y and 9 month and only build up my network which is .. a long list of friends about 500 all over the world*

Response units that were coded as 'peers' were also coded with: geography, economic (work), opportunity, rationalising, social, perception, personality, differentiation, role-play, closeness, trepidation, pastime, meeting, real-life, frequency, network, distinction, locations, usage, relations, applications, streaming, abbreviation and emoticon.

**Broad: Geography**

Where a response unit referred to a specific location, it was coded with the 'geography' theme. Response units were also coded with this theme when the participant was discussing 'here' or 'there' as a specific location. In all there were eight occurrences of this theme out of the 45 in this framework component area. Example response units that were coded with this theme are:

- *I am in the Seattle washington area*
- *they really dont have them here [internet cafes] like they do in europe I went to France a few years ago,and they had tons.*

Response units that were coded as 'geography' were also coded with: peers, economic (work), opportunity, rationalising, social, perception, personality, differentiation, role-play, closeness, trepidation, pastime, meeting, real-life, frequency, network, distinction, locations, usage, relations, applications, streaming, abbreviation and emoticon.

**Broad: Cultural**

The 'cultural' theme was applied to response units that mentioned participation in events, lifestyles or cultural practices. This involvement may have already occurred or was aspired to by the participant.

There were 7 instances of the cultural theme that occurred, examples of which are:

- *its the time of year for all the cool fall festivals and such to begin*
- *there is one not to far from me.* [real-life temple] *I went a couple of weeks ago to see the Jade Budda its doing a world wide tour it was amazing I got some reat pictures*

Response units that were coded as 'cultural' were also coded with: geography,

summation, meeting, real-life, distinction, locations and abbreviation.

**Broad: Economic (work)**

The 'economic (work)' theme was closely aligned with 'economic' theme. However, the focus for this theme was around the workplace and income generation. For example:

- *I have a rl job so I am not looking here*

Response units that were coded as 'economic (work)' were also coded with: peers, distinction and availability.

**Broad: Economic**

Where a response unit referred to money usage behaviour, it was coded with the 'economic' theme. This theme was more focused on in-world money spending or usage behaviour rather than income generation, which was dealt with separately to aid the separation of these codes and the subject matter being explored.

A response unit that was coded with the 'economic' theme is shown here as an example:

- *a few ways i guess sadly, i'll admit... i've used rl money lol sold old things for lindens and people sometimes will just give it away for whatver reason lol when i first joined... i told myself that i wouldn't waste rl money on sl was a strict rule of mine but i found something that i just HAD to have at the time*

Response units that were coded as 'economic' were also coded with: rationalising, desire, personality, distinction, usage, content and abbreviation.

**Broad: Infrastructure**

The 'infrastructure' theme is aligned with the 'geography' theme. However, the nature of the infrastructure theme is focused more on the facilities and make up of a place rather than the place. This theme emerged from the response units of a participant who discussed the availability of internet cafes or more precisely the lack thereof. This is of particular interest as the framework had originally only considered the notion of internet access as being primarily in the direct environment domain.

Two response units were coded with the infrastructure theme, they were:

- [internet cafes] *they really dont have them here like they do in europe I went to France a few years ago,and they had tons.*
- *i guess if I really wanted I could use the internet at starbucks but I try to*

*avoid chains*

Response units that were coded as 'peers' were also coded with: geography and availability.

**Broad: Technological**

The 'technological' theme emerged from two response units that alluded to a popular third-party Second Life viewer. In order to better understand these response units the reader should know that when interviewing took place the continued usage of the popular 'Emerald' viewer was in question by Linden Lab due to it being used for distributed denial of service attacks[19]. Also, the features of 'Emerald' made it superior to the Linden Lab offering in the view of many of the Second Life community.

The response units mentioned are:

- *they won't make me eat that :D well yes they are jealous on emerald left them look like noobs*
- *my understanding is that the "Emerald" team (except for the naughty ones) got together and started Phoenix*

The 'naughty ones' mentioned were those members of the 'Emerald' development team identified as being responsible for including the software code that allowed the distributed denial of service to take place. The 'Emerald' viewer was removed from the Linden approved third party viewer list[20], with the 'Phoenix' viewer still accepted as of this writing in early 2012[21]. Response units that were coded as 'technological' were also coded with: interpretation.

**Broad: Pastimes**

The 'pastimes' theme was used with response units that offered information about respondents leisure activity preferences. For example, one of the response units that was coded with pastimes was:

- *I like to camp and hike and read and travel go to live music*

This particular theme is of interest as it is indicative of user preferences outside of the Second Life environment and could be used from a market intelligence perspective to facilitate more suitable in-world content or to better understand the competition to

[19] http://alphavilleherald.com/2010/08/emerald-viewer-login-screen-sneak-ddos-attack.html
[20] http://alphavilleherald.com/2010/08/emerald-in-disgrace-philip-linden-warns-against-malicious-viewer.html
[21] http://wiki.secondlife.com/wiki/Third_Party_Viewer_Directory

Second Life usage.

**Broad: Family**

The 'family' theme was multi-coded on a single response unit. Here the response unit alluded to family in the generic sense as well as mentioning specific familial relationships.

The response unit that had the family theme applied to it is:

- *things have been busy with family lately my sister got married and my other sister had a baby so that takes up time*

**Broad: Production**

An emergent theme that came from one response unit was that of 'production'. The respondent spoke about the aspiration to physically manufacture an item of clothing based upon a virtual design. This virtual design would be chosen on the basis that the respondent had an avatar that was similar in appearance to the respondent's physical appearance and could therefore try out many virtual clothing designs to see which were most suitable. The use of virtual worlds to proto-type designs for physical manufacture is not a new idea and is a process used due to the 'simulator' nature of virtual world environments. Indeed, Second Life was used by the Hilton chain of hotels[22] for consumer testing of lighting, furniture placement and layout variations as well as by Henry Segerman for the design of a Hilbert Cube[23] which is now available as a physical object.

The response unit that was coded with 'production' was:

- *in order to see what I coudl wear or not and then eventually with the idea , of making the dresses , in RL*

This response unit was also coded with functionality and avatar.

**Broad: Purchase**

The 'purchase' theme is related to the production and economic themes already discussed. The focus of this theme is real world spending behaviour based upon in-world influences. Many businesses such as American Apparel, Cisco Systems and the Toyota Motor Corporation have used Second Life to advertise their real world products.

[22] http://designingdigitallyclients.com/ddinc09/portfolio/virtual-worlds/second-life-design-%E2%80%93-virtual-hilton-hotel-dulles

[23] http://www.wired.co.uk/news/archive/2011-12/30/hilbert-cube

The response unit that was coded with 'purchase' was:

- *and - I bought a book , which was advertised in SL*

This response unit was also thematically coded with distinction and abbreviation.

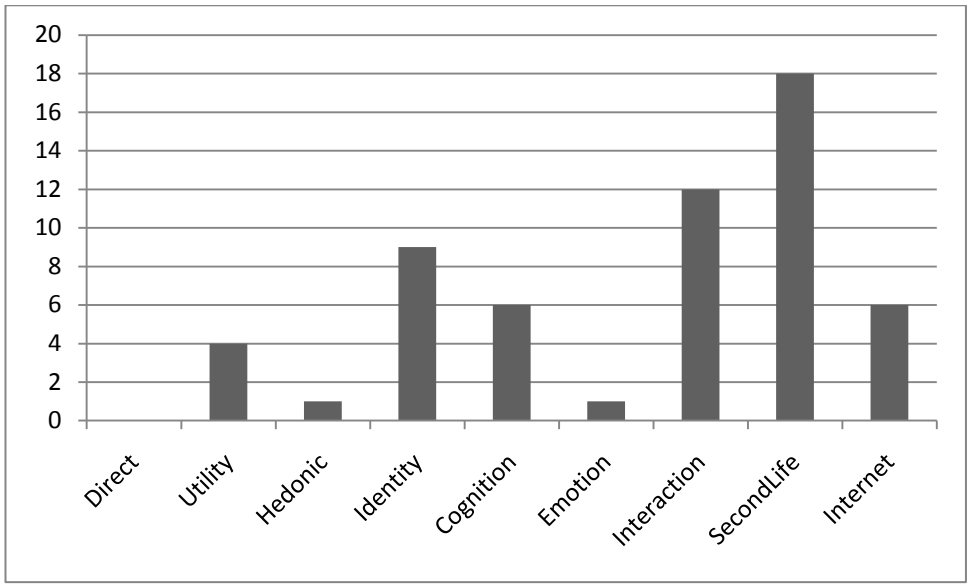


*Figure 11 Interrelation of the Broad environment with other components.*

Figure 11 shows the instances of response units that were in the Broad environment component that also appeared in other components.

### 5.1.02. The direct environment

For the **direct environment** component 10% of the response units were aligned to this component and here 6 themes were identified as shown in Table 5.

| Theme | Frequency |
|---|---|
| Accessories | 6 |
| Natural | 4 |
| Employment | 3 |
| Comparative | 2 |
| Finances | 2 |
| Technology | 1 |

*Table 5. Emergent themes and frequencies in the direct environment component.*

**Direct: Accessories**

The 'accessories' code was given to response units that indicated physical objects that were nearby the respondent and had some meaning to them. For example, one respondent spoke about a coffee machine they had won from a Second Life competition. This theme is indicative of the interaction between the real and virtual experience.

The response units for the coffee machine example just given were:

- *I even won a rl coffeemachine in SL*
- *coffeemachine - is great got it for x mas 1 y ago works fine*
- *yes - kind of a competition one had to sit with friends - and have talks and you got points the one with the most pèoints , got the machine*

Other thematic codes that were applied to response units that were given the 'accessories' code were: comparative, distinction, usage, applications and abbreviation.

**Direct: Natural**

Response units that pertained to the weather were coded with 'natural'. Of interest here is the way that respondents had different attitudes to the same type of weather. For example, two respondents from the group interview had opposing attitudes

towards rain.

Example response units that show this were:

- *JamieLynn* [Surname] *loves the rain*
- *you can have it JamieLynn....its always raining here :( weve had a couple of lovely days...but i think autumn arrived today*

**Direct: Employment**

The 'employment' theme arose from respondents that specified their employment in reality. This theme is about primarily about income generation and can be exemplified with the following response units:

- *yes - it is very intrieguing as you now know I am unemployed*
- *yes and I have even made rl money because I sold one of my products to an american guy I met in SL not much , its a start*

Response units that were coded with the 'employment' theme here were also allocated to the finances, meeting, real-life and abbreviation codes.

**Direct: Comparative**

When a respondent described their immediate environment during Second Life usage and compared it with alternative environments or parallel pursuits in the same environment, it was coded with 'comparative'. This theme is therefore closely aligned with accessories and to a certain extent pastimes.

For example one response unit that was coded as 'comparative' was:

- *and in parallel I have a second computer - books - etc*

**Direct: Finances**

The 'finances' code was given to response units that made statements about nature of how the Second Life financial position of the respondent arose. For example:

- *I will have to buy lindens soon and will use Paysafe card because I do not have a credit card*

**Direct: Technology**

The 'technology' theme was given to response units that specified the type of technology the respondent was using to access Second Life with.

An example response unit that had the 'technology' code applied to it is:

- [access sl?] *laptop , home and I recently bought a new Laptop in order to take*

*it to my sons, if necessary as I am /was addicted to SL*

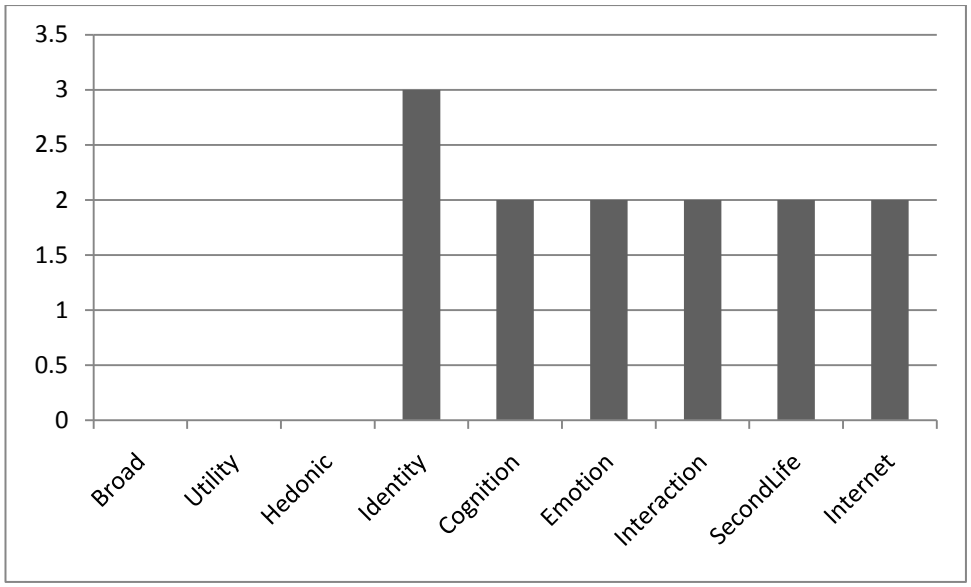


*Figure 12 Interrelation of the Direct environment with other components.*

### 5.1.03. The hedonic user experience

The **hedonic user experience** component relates to those factors that affect the user experience of Second Life. The component had 15% of response units align with it; 7 different themes were identified during analysis as can be seen in Table 6.

| Theme | Frequency |
|---|---|
| Taste | 14 |
| Entertainment | 4 |
| Exploration | 4 |
| Aversion | 2 |
| Desire | 2 |
| Satisfaction | 1 |
| Mask | 1 |

*Table 6. Emergent themes and frequencies in the hedonic environment component.*

**Hedonic: Taste**

There were 14 occurrences of the 'taste' theme, which was given to response units that indicated a participant's preference for in-world events, locations or goods. Response units gave a clear view of what types of things respondents liked and therefore could be used as basis for content generation by in-world merchants. Further, one respondent spoke about hybrid space (see section 4.6) conferences and went on to explain that these were in-world events where real world events had live video streamed into a Second Life location. Here the respondent referred to these events as ‘mixed-reality’. The researcher has seen this approach taken during a number of conferences where the organisers felt that a Second Life counterpart would be appropriate and indeed allow for broader participation by those unable to attend the physical event.

Example response units for this theme were:

- *a sexy kitty outfit*
- *Demonic Night Dance Club (great people that make me laugh and great music)*

- *I like to go to conferences , mixed reality*

Response units that were coded with 'taste' were also coded with: rationalising, aversion, entertainment, physical, personality, avatar, taste, identification, timeframe, judgement, pastime, distinction, locations, usage and interface.

**Hedonic: Entertainment**

There were four occurrences of the 'entertainment' code based upon response units that specified an in-world activity or location that the respondent stated as being enjoyable to them for entertainment purposes, this theme is closely aligned with 'taste'.

For example, this code was applied to the following response unit:

- *yea sometimes... depends on their sense of humor, etc i like to find the silliest/weirdest sims i can...and just check them out. some pretty entertaining stuff on here. amazing to think the time and thought that has been put into these places*

Response units that had the 'entertainment' code applied to them were also allocated with: functionality, exploration, taste, query, judgement, pastime, meeting, locations, entertainment, relations, streaming and the emoticon codes.

**Hedonic: Exploration**

Response units that contained information referring to exploration of Second Life as an activity were coded with 'exploration'. This theme is closely aligned to the 'entertainment' theme and some response units, such as the example shown for the 'entertainment' theme were allocated with both codes. It has been the researcher's experience that exploring Second Life for the sake of discovering a location that has a pleasing build, aesthetic, music or activities for the explorer is a common pursuit by many Second Life users.

Example response units that were coded with 'exploration', are:

- *i like haning at Alt7 and hang at Hyde quite a bit...where i met my bf =P it's an Indie rock club yup...love finding new music!*
- *i have found some cool sims on my own*

Response units that were coded with 'exploration' were also coded with: functionality, entertainment, query, judgement, pastime, meeting, locations, entertainment, relations and streaming

**Hedonic: Aversion**

The 'aversion' code was applied to response units where a respondent made a negatively oriented statement about their experience of Second Life. This took the form of either negative experiences in-world or the use of Second Life as an avoidance strategy.

An example response unit that had the 'aversion' code given to it is:

- *thats another thing i HATE about sl my fav sims being deleted or something along the lines i had a fav beach...noww its some free sex paradise or something had some good memories in those places =P eh well... such is life*

The response units that were coded with 'aversion' were also coded with: taste, contempt, judgement, locations, usage, financial, content, abbreviation as well as the emoticon code.

**Hedonic: Desire**

Response units that were coded with 'desire' were statements where the respondent discussed the notion of their wants. Response units that were coded with this theme are indicative of the reasoning a respondent gave for altering their usual behaviour. For example:

- *a few ways i guess sadly, i'll admit...i've used rl money lol sold old things for lindens and people sometimes will just give it away for whatver reason lol when i first joined... i told myself that i wouldn't waste rl money on sl was a strict rule of mine but i found something that i just HAD to have at the time*

The response units that were themed with 'desire' were also allocated to: economic, rationalising, personality, distinction, usage, content as well as abbreviation.

**Hedonic: Satisfaction**

The 'satisfaction' code was applied where a response unit described a sense of satisfaction felt by the respondent. For example, one participant explained that they enjoyed Second Life and then went on to state:

- *well, i get to meet interesting people... and... get to help out with new residents arrive*

**Hedonic: Mask**

In this component area, the 'mask' code was used when a response unit indicated the

notion of role-play and the enjoyment or pleasure derived from it. Although closely aligned with identity issues, the code is used here as fantasy role-play falls within what Hirschman and Holbrook (1982, p. 92) defined as hedonic, that is "those facets of consumer behaviour that relate to the multi-sensory, fantasy and emotive aspects of one's experience"

An example response unit that was coded with 'mask' follows:

- [played as different roles?] *yes, very different*
  *different ages and genders*
  *A few furry avatars, but not generally furry*
  *as is Dragon play... the role play gets old*

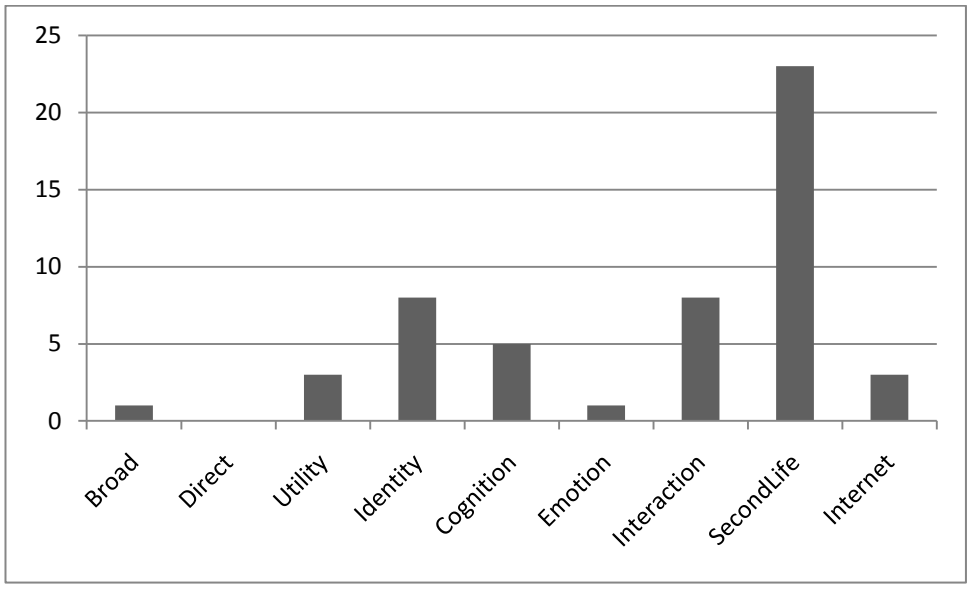


*Figure 13 Interrelation of the Hedonic environment with other components.*

### 5.1.04. The utilitarian user experience

The **utilitarian user experience** component of the framework describes elements of the functional value in using Second Life. Here 6% of response units fell into this component description and as shown in Table 7, there were 7 themes were identified.

| Theme | Frequency |
|---|---|
| Functionality | 3 |
| Rationalising | 3 |
| Opportunity | 2 |
| Employment | 1 |
| Knowledge | 1 |
| Cost | 1 |
| Finances | 1 |

*Table 7. Emergent themes and frequencies in the utility environment component.*

**Utility: Functionality**

The 'functionality' code was used with response units that made statements about the use of Second Life features. This is distinct from the 'opportunity' code which focused upon statements about using Second Life features for a given purpose. Here the focus is on the use of Second Life features to carry out a given act. For example, the use of the search mechanism built into the Second Life interface or the use of the building tools to create a virtual object.

The following statement was made while the respondent demonstrated how they build using in-world tools:

- *hi there*
  *this is part of sim I can buildon*
  *I am not good at it*
  *you get your mic*
  *295 u$*
  *tier*

Response units that were given the 'functionality' code were also allocated: production, cost, entertainment, exploration, avatar, query, judgement, locations, entertainment, usage and financial codes

**Utility: Rationalising**

There were three occurrences of the 'rationalising' code. This was used where a

response unit indicated that the respondent had gone through some form of rationalisation process to account for the decisions they had made.
An example response unit that was coded with 'rationalising' was:

- *a few ways i guess sadly, i'll admit...i've used rl money lol sold old things for lindens and people sometimes will just give it away for whatver reason lol when i first joined... i told myself that i wouldn't waste rl money on sl was a strict rule of mine but i found something that i just HAD to have at the time*

The response units that were given the 'rationalising' code were also allocated: peers, geography, economic, desire, taste, personality, taste, meeting, real-life, distinction, content, streaming, abbreviation and emoticon codes.

**Utility: Opportunity**

Here the 'opportunity' code was used to indicate occurrences of statements that showed a respondent was aware and/or making use of the features of the Second Life virtual world. Although closely aligned with 'usage' from the Second Life component area, the 'opportunity' code is used where a respondent is making use of the features available in Second Life for a given specific purpose.
For example, when explaining the use of Second Life for running language classes, the respondent stated:

- *immersive*
  *no travel costs*
  *no office costs*
  *easier to learn*
  *not easier to teach*
  *lots of work*

**Utility: Employment**

The 'employment' code was used where a response unit indicated in-world employment. This is distinct from the 'employment' code used in the direct environment component area as this code deals with virtual income generation.
An example response unit that was coded with 'employment' was:

- *used to*
  *was a hostess at a pub and my ex sl bf and i did pics etc*
  *was at coach and horses pub... they wanted me to work 4hrs in a row a night for tips...late*

*hours, when no ones on... wasn't making any money*

**Utility: Knowledge**

The 'knowledge' code was used in the utility component area for a response unit that indicated the requirement or acquisition of skills and knowledge in the operation of Second Life features. Apart from the acclimatisation during the initial orientation, see section 1.4, skill acquisition of the more advanced features offered in Second Life such as object building is left to the user to acquire.

For example:

- *skills*

  *I do not know how to do most of the scripting - and .building what I still miss - is that someone tells you how to create .. I am kind of stuck in a wheel*

This code is aligned with but distinct from both the 'opportunity' and 'functionality' codes in this component area as it is focused on the knowledge required to operate the features available when using Second Life.

**Utility: Cost**

Where a response unit specified a cost to the use of Second Life or feature available therein, the response unit was allocated 'cost' as a code. In the example below, the price of owning a virtual area of land is shown:

- *hi there*

  *this is part of sim I can buildon*

  *I am not good at it*

  *you get your mic*

  *295 u$*

  *tier*

**Utility: Finances**

The 'finances' code was used where a response unit indicated the nature of the respondents in-world income generation. This is distinct from but related to the 'employment' code in this component area. In the example below the respondent explains that their income is from the tips given to them by others, whereas their employment was as a hostess. Further, the respondent goes on to state this method of income generation was not, in this instance, adequate for their needs.

- *used to*

*was a hostess at a pub and my ex sl bf and i did pics etc*

*was at coach and horses pub... they wanted me to work 4hrs in a row a night for tips...late*

*hours, when no ones on... wasn't making any money*

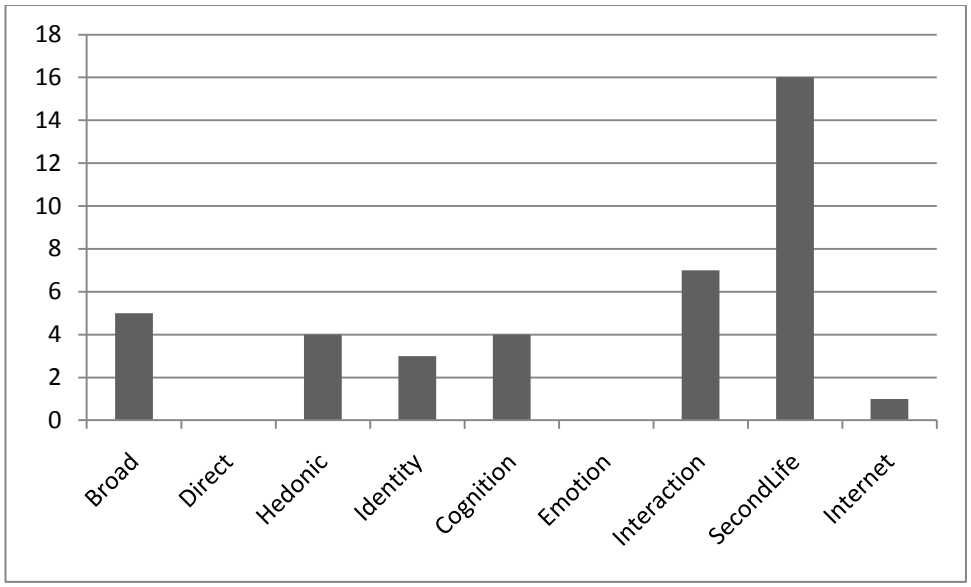


*Figure 14 Interrelation of the Utility environment with other components.*

### 5.1.05. The identity user experience

The **identity user experience** component had 28% of all response units align with it and 8 different themes were identified, these are shown in Table 8.

| Theme | Frequency |
|---|---|
| Perception | 15 |
| Avatar | 8 |
| Differentiation | 8 |
| Personality | 7 |
| Role-play | 7 |
| Social | 3 |
| Physical | 3 |
| Taste | 1 |

*Table 8. Emergent themes and frequencies in the identity environment component.*

**Identity: Perception**

There were 15 occurrences of the 'perception' code being used in the identity component area. The 'perception' code was allocated to response units that denoted an element of self-perception. Further, the 'self' being spoken about by the respondent could pertain to the physical or the virtual. Again a blurred boundary between the real and virtual worlds is shown when we consider the notion of self-perception. For example, the following is an extract from the group interview:

- [Avatar 1] *me? ermmm....since November 08*
  *im well old*
- [Avatar 2] *5 April 09*
- [Avatar 1] *blimey...im older than you Bryan, this doesnt bode well with me*
- [Avatar 2] *mmm*
  *only in sl*

Another example of a response unit that was coded as 'perception' was:

- *i don't really know honestly lol... i have loads of friends, but i kinda keep to myself until approached which i am a lot like in rl*
  *its hard enough being myself, let alone pretending to be something that im not*

Response units that were coded with 'perception' were also coded with: peers, natural, social, perception, personality, differentiation, role-play, identification, deduction, intent, closeness, trepidation, real-life, distinction, relations, financial, abbreviation, extended and emoticon.

**Identity: Avatar**

For response units that pertained to the respondent's avatar, the 'avatar' code was used. There were eight instances of this code being used where response units made an explicit or implicit comment about their own avatar.

Two response units are shown here as examples:

- *its close*
  *i have bigger hips in rl lol*
  *both [looks & personality]*
  *i dress about the same*
  *no lip peircing in rl though*
  *yeah I am not as slim*
  *lol*
- *most of my lindens went for the skin which someone here just said my AV looks terrible and really new but I dont care I think it looks good*

Response units that were coded with 'avatar' were also coded with: production, functionality, taste, physical, personality, identification, Self-determination, contempt, undesired, usage, financial, content and abbreviation.

**Identity: Differentiation**

There were eight occurrences of the 'differentiation' code. Response units were coded with this when the respondent made a statement about the distinction between their core personality and a role played one.

Example response units that the 'differentiation' code was applied to were:

- *in London I see myself as me*
  *in Gor Im a warrior*
- *i am me....i couldnt even try to be someone else, i would fail*
- *I have lots of accounts, all different*
  *they're all different parts of me*

Other codes that which were applied to the response unit with the 'differentiation' code, were: peers, masks, social, perception, personality, role-play, trepidation, real-life and abbreviation.

**Identity: Personality**

The 'personality' code was used seven times where respondents made statements relating to the respondent's beliefs about their own personality or aspects thereof.

Therefore this code is closely aligned with others that deal with notions of self-image. Some examples of response units with the 'personality' code follow:

- *maybe 5-6hrs a wk*
  *i used to be addicted to this thing*
- *is real me..i dont pretend to be someone i am not*

Other codes that were allocated to the response units that were given the 'personality' code were: peers, economic, rationalising, desire, taste, social, perception, physical, avatar, differentiation, role-play, trepidation, real-life, distinction, usage, content and abbreviation.

**Identity: Role-play**

Seven occurrences of the 'role-play' code were used with response units that indicated that the idea of the respondent playing a role when using Second Life.
For example:

- [played as different roles?] *yes, very different*
  *different ages and genders*
  *A few furry avatars, but not generally furry*
  *as is Dragon play... the role play gets old*

However, the 'role-play' code was also applicable to response units where a respondent stated explicitly that they didn't role-play. For example:

- *i am me....i couldnt even try to be someone else, i would fail*
- *like man or women*
  *no I am myself in SL*
  *I do not play a role*
  *not yet*

The response units that were coded with 'role-play' were also coded with: peers, masks, social, perception, personality, differentiation, trepidation, real-life, entertainment and abbreviation codes.

**Identity: Social**

The 'social' code was given where response units made a statement about social interaction. Moreover, this code was applied where the respondent showed that a given interaction, or lack thereof, affected the respondent and/or their behaviour.
For example:

- *my friends... i know it's sl, but i've become as close to some of them as some*

*friends in rl*

*silly i know =P*

The response units that were coded with 'social' were also coded with: peers, perception, personality, differentiation, role-play, closeness, trepidation, real-life, distinction, relations, abbreviation and emoticon.

**Identity: Physical**

The 'physical' code was attributed to response units where the respondent made a statement about their physical appearance. Self-perception and perception of a virtual self are tied together, for example Fox and Bailenson (2009) showed that behaviour modification can result from this tie.

Example response units that were given the 'physical' code:

- *i'm going to guess they like redheads?*
  *i have red hair in rl...well now i do lol*
  *would youl ike to see a pic?*
  *yup that'sme*
- *as a matter of fact , I made an other shape*
  *looking like my own body .. in rl*

**Identity: Taste**

Only one response unit was coded with 'taste' in the identity component area. Here a distinction is made from the taste code in the hedonic component area as the respondent statement explicitly relates to their own personal style as well as to in-world preferences.

The response unit that the 'taste' code was applied to in this component area was:

- *if i had to pick 1 shop it would be atomic*
  *plays great music as well =P*
  *its got my style of clothing... same as rl well... for the most part*

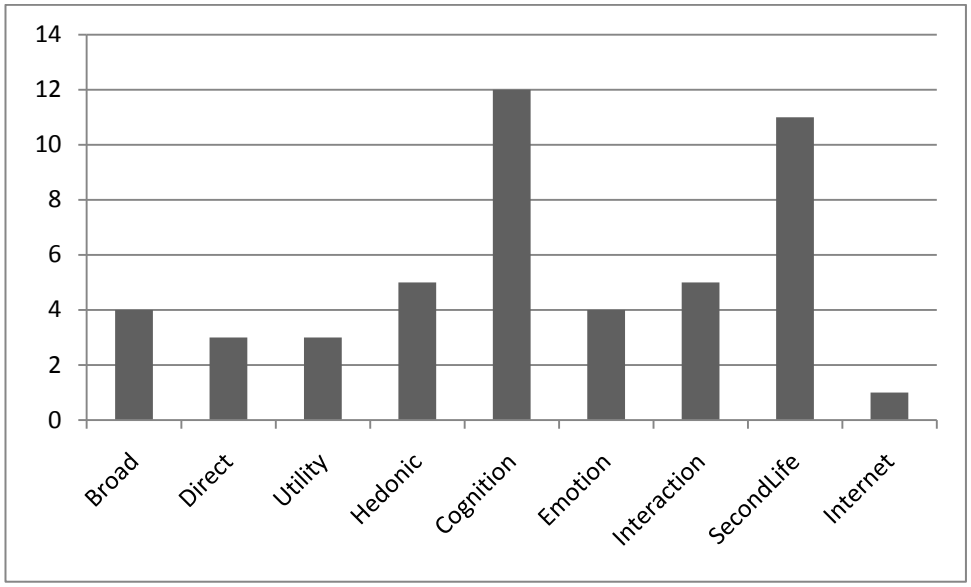


*Figure 15 Interrelation of the Identity environment with other components.*

### 5.1.06. Cognition

The **cognition** component of the framework relates to rational thought processes predominantly to do with choice. Here 32% of all response units related to this component and Table 9 shows the 8 themes which were identified during analysis.

| Theme | Frequency |
|---|---|
| Timeframe | 19 |
| Query | 11 |
| Deduction | 9 |
| Summation | 8 |
| Identification | 5 |
| Intent | 4 |
| Interpretation | 3 |
| Self-determination | 1 |

*Table 9. Emergent themes and frequencies in the cognition environment component.*

**Cognition: Timeframe**

The 'timeframe' code was applied to response units that made a specific reference to a period of time. Usually the response units coded with 'timeframe' were explaining the amount of time the respondent had been using Second Life. For example:

- *a lot*
  *lol*
- *20+ hours a week i guess*

**Cognition: Query**

The 'query' code was applied to response units where explicit or implicit questioning was found. Here, implicit questioning is demonstrated by the use of the term 'wonder', which in essence is to speculate on a matter and can be perceived as a question to oneself.

Example of response units that were coded with 'query':

- *things like that, i wonder how its done*
- *so u like viewer 2 Canton? :)*
  *u're grey to me [textures not visible]*

The second example shown is a question posed during the group interview by one of the interviewees to another.

**Cognition: Deduction**

The 'deduction' code was applied to nine response units. This code was given to response units where the respondent gave a statement that contained logical reasoning.

For example:

- *I think SL will be unstable for a few months, as they transition to HTTP delivery of textures, while leaving everything else through the LL protocol*
- *but - then I have to learn - what will be true in which situation ..*

Response units that had the 'deduction' code applied to them were also coded as: perception, physical, identification, summation, interpretation, intent, judgement, meeting, lack, frequency, distinction, interface and abbreviation.

**Cognition: Summation**

The 'summation' code was applied to response units where the respondent had summarised their thoughts on a given matter.

As an example, one response unit that was coded with 'summation' was:

- [time spent in sl?] *A CRAP LOAD!!!!*

Further, one respondent had explained how they wanted to use Second Life for an experiment in weight management by using scripted objects as 'food' that changed an avatar's shape depending upon what was eaten. When asked if this was a before and after approach the respondent stated:

- *yes*
  *and no*
  *it is to learn .. how to script . to learn how to eat .. and to see the result*

**Cognition: Identification**

The 'identification' code was applied to response units when a statement was made identifying someone/something other to themselves.

Example response units that were coded with identification arre:

- *no way MIT?! excellent...makes you older than me*
- *Emerald/Phoenix have built-in AO support, which is nice idea, but doesn't work well*

The first example relates to the researcher's avatar (named Mit Charmann), while the second example relates to third party viewers which could be used instead of the official Linden Lab Second Life viewer.

**Cognition: Intent**

Response units that made a declaration of intention were coded with 'intent'. This code is distinct from 'desire' as found in the hedonic component area as the 'intent' code was applied to response units that demonstrated an intention to pursue an objective as opposed to stating a want.

For example:

- *then , I also wanted to .. use my shape - to make an experiment*
- *because lots of money , I am not advanced enough*
  *will decide .. .. in a few*

The response units that were coded with 'intent' were also coded with: perception, identification and deduction.

**Cognition: Interpretation**

The 'interpretation' code was used where a response unit stated a line of reasoning. This is similar to the 'deduction' code but distinct in that the 'interpretation' code was applied to response units where the respondent seemed unsure about the veracity of a statement made by them.

For example:

- *i'm not 100% sure, thought I saw something about it, though*

**Cognition: Self-determination**

The 'self-determination' code was used where a response unit showed a line of reasoning from a respondent for self determination of their Second Life experience. This code was only applied to one response unit, which was:

- *the sex portion of it...i'm SO over being harassed for pixel sex. i should be allowed to have a 'sexy' avie without being sent dirty pics, etc lol*

This particular response unit was also coded with: avatar, identification, contempt, undesired and abbreviation.

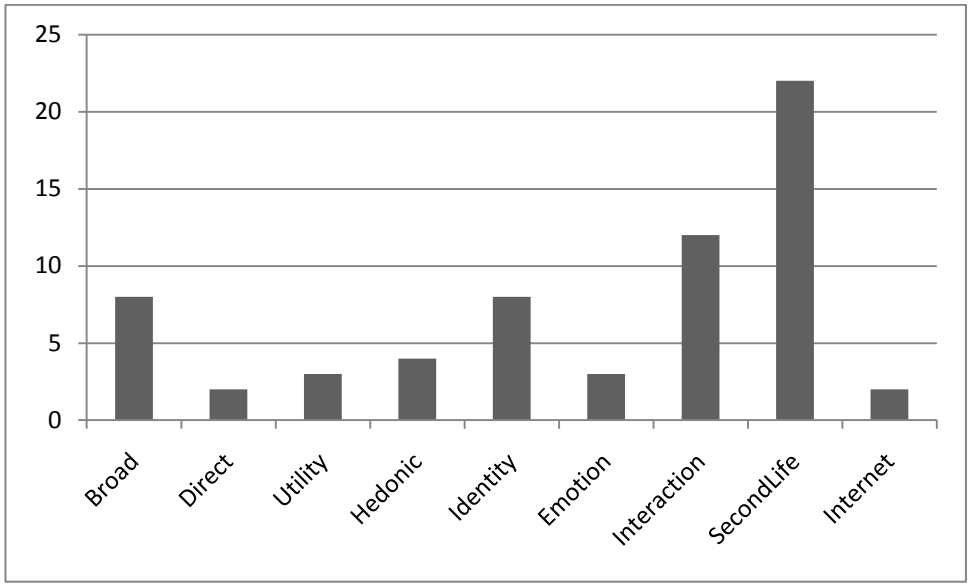


*Figure 16 Interrelation of the Cognition environment with other components.*

### 5.1.07. Emotion

There were 7% of response units which related to the **Emotion** component; from the 14 responses 7 themes were identified, see Table 10.

| Theme | Frequency |
|---|---|
| Contempt | 5 |
| Fear | 3 |
| Pleasure | 2 |
| Closeness | 1 |
| Disappointment | 1 |
| Humour | 1 |
| Appreciative | 1 |

*Table 10. Emergent themes and their frequency in the emotion environment component.*

**Emotion: Contempt**

The 'contempt' code was applied to response units that related respondents annoyance about a particular matter in their experience of Second Life. It is interesting to note that the majority of the response units this code was applied to described some aspect of sexual relationships.

Example response units that were coded with 'contempt':

- *the sex portion of it...i'm SO over being harassed for pixel sex. i should be allowed to have a 'sexy' avie without being sent dirty pics, etc lol*
- *btw this was the annoying side of SL*

  *you can not have a bf - and talk to someone , without having problems*

The response units that were coded as 'contempt' were also coded with: aversion, avatar, identification, Self-determination, undesired, demands, distinction, locations, relations, financial, content, abbreviation and emoticon.

**Emotion: Fear**

The 'fear' code was used with response units that made statements where the respondent was fearful of something happening. Therefore statements about actions taken to prevent an unwanted future possibility from happening by the respondent were coded using 'fear'.

An example of the 'fear' code being used:

- *and I paid for the tier , because I do not want to let it disappear*

Other codes that were applied to response units that were coded with 'fear' were: technology, distinction, locations, usage, financial and abbreviation.

**Emotion: Pleasure**

The 'pleasure' code was given to response units that described a sense of pleasure being derived by a respondent when engaged in a particular activity in-world.
For example:

- *yes there is a buddhist sim that I enjoy*
  *ts very relaxing and the music is nice*
  *its a nice community*
- *i love nekos! it's cute, sexy, love nekos!*

The second example describes the pleasure felt by this interviewee for a certain style of accessorising their avatar and role-play; the term ‘neko’ is a Japanese word meaning cat, and in Second Life whole communities exist around this concept of being part person and part cat. Response units that were coded with 'pleasure' were also coded with: judgement, locations, content and streaming.

**Emotion: Closeness**

The 'closeness' code was used where a response unit described strong personal friendship with others.
The example here for 'closeness' is:

- *my friends... i know it's sl, but i've become as close to some of them as some friends in rl*
  *silly i know =P*

**Emotion: Disappointment**

The 'disappointment' code was used where a respondent described a sense of being discouraged through a given experience in-world. For example, one respondent who was relatively new to using Second Life explained the lack of engagement by others as:

- *I awlays say hi to people,But maybe its a down with newbie snobbery thing thats going on*

**Emotion: Humour**

When a response unit contained a humorous statement it was coded with 'humour'. For example, when discussing the length of time respondents had been using Second Life during the group interview, one respondent stated:

- *no way MIT?! excellent...makes you older than me*

Here age was transposed with period of time spent in Second Life.

**Emotion: Appreciative**

The 'appreciative' code was used with response units that made a statement of appreciation or gratitude about a given matter.

For example:

- *the only - bad feeling I have , is when I go outside .. must always recongnise I am in a very nice surrounding*

Here the respondent was explaining their state of mind during Second Life usage. Of interest here is that in this response unit the respondent feels the need to be appreciative of their physical environment.

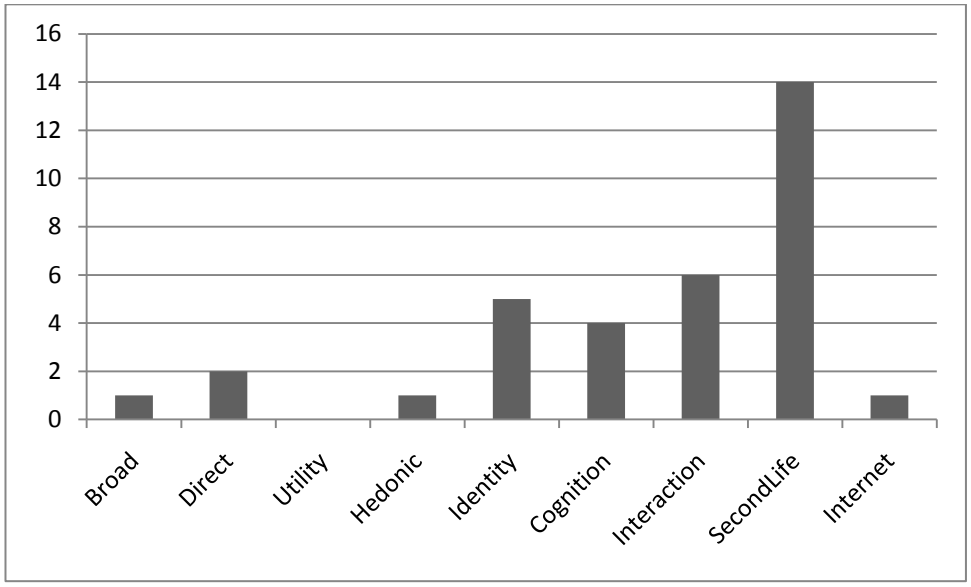


*Figure 17 Interrelation of the Emotion environment with other components.*

### 5.1.08. Interaction

The **Interaction** component had 25% of response units relate to it; from these response units, see Table 11, there were 13 themes identified.

| Theme | Frequency |
|---|---|
| Meeting | 9 |
| Judgement | 6 |
| Pastime | 6 |
| Real-Life | 5 |
| Co-operation | 4 |
| Frequency | 4 |
| Lack | 3 |
| Demands | 3 |
| Undesired | 2 |
| Gifting | 2 |
| Network | 2 |
| Trepidation | 1 |
| Uncertainty | 1 |

*Table 11. Emergent themes and frequencies in the interaction environment component.*

**Interaction: Meeting**

There were 9 occurrences of the 'meeting' code in this component area. The 'meeting code' was applied to response units which contained statements that described a meeting or encounter with others in-world. The key criterion for the use of this code was that the meeting had to take place within the Second Life virtual world as opposed to the physical.

Example response units that were coded with 'meeting' follow:

- *probably to my house =P*
  *hang out there with friends*
  *i have a friend that lives in ohio...we keep in touch in sl alot*
  *go to my little sl home and watch videos etc*
- *yes*
  *and I have even made rl money*
  *because I sold one of my products to an american guy*
  *I met in SL*
  *not much , its a start*

Response units that were coded with 'meeting' were also attributed with: peers, geography, cultural, employment, finances, rationalising, entertainment, exploration, satisfaction, deduction, pastime, meeting, lack, real-life, locations, usage, relations, streaming, abbreviation and emoticon.

**Interaction: Judgement**

The 'judgement' code had six occurrences and was used on response units that described a judgement being passed. The perception of judgement that was described in the response units could have been from the respondent or by others.

The following example response unit shows the participant's perception of being judged by others:

- *I awlays say hi to people,But maybe its a down with newbie snobbery thing thats going on*

This particular example is interesting in that if there is a perceived element of snobbery occurring, then in-world content/service providers would do well to provide or ensure a culture of social inclusiveness especially with regard to new users of Second Life. More experienced users, the researcher has observed, tend to have built-up a network of friends and acquaintances but again this should not be taken for granted by content/service providers.

Response units coded with the 'judgement' code were also coded with: functionality, aversion, entertainment, exploration, taste, query, deduction, pleasure, disappointment, judgement, lack, frequency, locations, entertainment, usage, financial and streaming as codes to describe these response nits.

**Interaction: Pastime**

The 'pastime' code was used in the component area when a response unit contained a statement which described a leisure activity in-world. Relating an in-world interaction of a leisure activity is the essential difference in criteria to the 'pastime' code used in the broad environment component area which was focused upon leisure activities apart from the Second Life environment.

An example of a response unit coded with 'pastime' is:

- *yea...my friends and i think up random words and do a search for that word....first to come up with that word in the search, is the sim we go to lol*

Others codes that were applied to response units which were coded with 'pastime'

were: peers, geography, entertainment, exploration, taste, meeting, real-life, locations, relations, streaming, abbreviation and emoticon.

**Interaction: Real-life**

The 'real-life' code was applied to response units which made statements relating the respondent's experience and interactions with others away from Second Life. Essentially this code is about the respondents' experiences outside of the Second Life domain and how those experiences affect the way the respondent behaves in-world. Example response units that were coded with 'real-life' were:

- *i don't really know honestly lol... i have loads of friends, but i kinda keep to myself until approached which i am a lot like in rl*
- *its hard enough being myself, let alone pretending to be something that im not*
- *probably to my house =P*
  *hang out there with friends*
  *i have a friend that lives in ohio...we keep in touch in sl alot*
  *go to my little sl home and watch videos etc"*

Other codes that were applied to response units which were given the 'real-life' code were: peers, geography, cultural, employment, finances, rationalising, social, perception, personality, differentiation, role-play, trepidation, pastime, meeting, real-life, locations, relations, streaming, abbreviation and emoticon.

**Interaction: Co-operation**

The 'co-operation' code was applied to response units which describe in-world joint ventures with others. Specifically, this code was used where the response unit included a description of a shared in-world activity. Although aligned with the 'pastime' code described previously in this component area, the 'co-operation' code was used when at least one other was mentioned. This code therefore draws a distinction in that the response unit was required to include a third party as well as the activity being described by the respondent to differentiate it from the 'pastime' code, although the two codes are not mutually exclusive for application to response units. Examples of response units which were coded with the 'co-operation' are:

- *we tend to come on together*
  *lol*
- *yea...my friends and i think up random words and do a search for that word....first to come up with that word in the search, is the sim we go to lol*

Other codes that were given to response units with the 'co-operation' code were: employment, finances, entertainment, summation, pastime, lack, real-life, frequency, network, entertainment, content, streaming, streaming and highlight.

**Interaction: Frequency**

The 'frequency' code was used with response units where the respondent made a statement which described an amount in regard to interactions or the frequency with which interactions were carried out.

Example response units which were coded with 'frequency' are:

- *I awlays say hi to people,But maybe its a down with newbie snobbery thing thats going on*
- *i have noticed that most people dont talk to each other*
  *they just dont talk.*
  *you are the 4th person besides my friends that has talked*

The response units which were coded with 'frequency' were also attributed with the peers, deduction, disappointment, judgement, lack, usage and interface codes also.

**Interaction: Lack**

The 'lack' code was applied to response units where a respondent described a situation in which interaction with others was lacking. A situation of ‘lack’ seemed to arise when there were few others for the respondent to interact with and/or due to others not choosing to interact.

Example response units which were coded with 'lack':

- *i have noticed that most people dont talk to each other*
  *they just dont talk.*
  *you are the 4th person besides my friends that has talked*
  *I like to meet people - but they are difficult to find .. lol - even if I have a long list of friends*

With regard to this code, when it comes to the number of others that can be interacted with, there are some interesting issues relevant to this investigation. For example the overall number of people using Second Life, the likelihood of interacting with those we already know and user communities less likely to use Second Life due to policy changes by Linden Lab. Regarding user communities less likely to use Second Life an example is Higher Education users, who had until October 2010 a cheaper tariff

offered to them by Linden Lab. This is now no longer the case[24] and many Higher Education Second Life users have moved to alternatives such as 'OpenSim'[25].

**Interaction: Demands**

The 'demands' code was used with response units where respondents had made statements that described a demand being made upon them by another party in Second Life.

The following example response unit was coded with 'demands':

- *used to was a hostess at a pub and my ex sl bf and i did pics etc was at coach and horses pub... they wanted me to work 4hrs in a row a night for tips...l ate hours, when no ones on... wasn't making any money*

In the example given here, the demand being made upon the respondent by their in-world employer to work a shift that seemed to the respondent to be a less lucrative option then other shifts. Response units that were coded with 'demands' were also coded with: employment, finances, summation, contempt, lack, distinction, relations, financial and abbreviation codes.

**Interaction: Undesired**

There were two instances of response units having the 'undesired' code applied to them. This code was used where a respondent made a statement describing the unwanted attention of others. Both response unit statements were focussed on the respondent being uncomfortable with advances/attention of a sexual nature being made to them.

An example response unit that was coded with 'undesired' is:

- *the sex portion of it...i'm SO over being harassed for pixel sex. i should be allowed to have a 'sexy' avie without being sent dirty pics, etc lol*

**Interaction: Gifting**

Where a response unit made a statement concerning the giving or receiving of a virtual object and/or money in-world, the response unit was coded with the 'gifting' code. It should also be noted that being able to send an individual money directly is an available option through the Second Life interface and making virtual content available to others for free is an established practice by Second Life content creators.

[24] http://community.secondlife.com/t5/Land/Two-Important-Updates-on-2011-Land-Pricing/ba-p/667773

[25] http://opensimulator.org/wiki/Main_Page

For example, in response to being asked "How do you finance your Second Life purchases?", one respondent made the following statement:

- *tips and free clothing stores*

The response unit which were coded with 'gifting' were also coded with the: physical, deduction, frequency, locations and extended codes.

**Interaction: Network**

Use of the 'network' code was applicable to response units which discussed the respondent's in-world associates. The term network was used to encompass associates of varying degrees of closeness to the respondent.

An example response unit which had the 'network' code:

- *I have been using SL for 2 y and 9 month*
  *and only build up my network*
  *which is .. a long list of friends*
  *about 500*
  *all over the world*

**Interaction: Trepidation**

The 'trepidation' code was used when a response unit described a situation wherein the respondent showed feeling of anxiousness or apprehension about a social interaction or encounter.

An example response unit which was coded with 'trepidation':

- *i don't really know honestly lol... i have loads of friends, but i kinda keep to myself until approached which i am a lot like in rl*
- *its hard enough being myself, let alone pretending to be something that im not*

Other codes used with a response unit coded with 'trepidation' were: peers, social, perception, personality, differentiation, role-play, real-life and abbreviation.

**Interaction: Uncertainty**

The 'uncertainty' code was used where a response unit described an interaction that the respondent felt they did not entirely understand. The following example response unit coded with 'uncertainty' shows the respondent felt that they did not understand the motivation for the interaction, in this case the giving away of money.

- *a few ways i guess*
  *sadly, i'll admit...i've used rl money lol*

*sold old things for lindens*

*and people sometimes will just give it away for whatver reason lol*

*when i first joined...i told myself that i wouldn't waste rl money on sl was a strict rule of mine but i found something that i just HAD to have at the time*

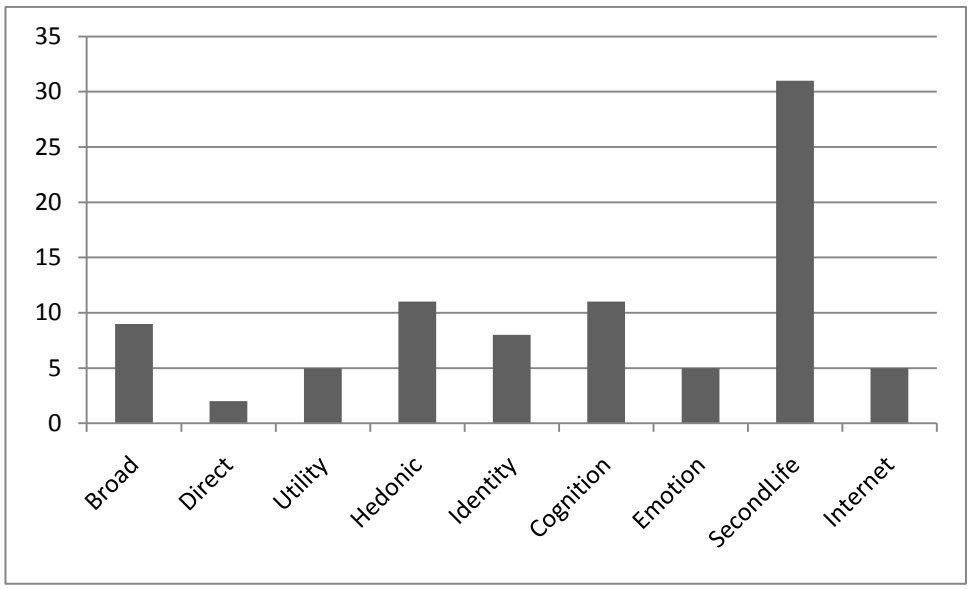


*Figure 18 Interrelation of the Interaction environment with other components.*

### 5.1.09. Second Life

The **Second Life** component of the framework had 61% of response units relate to it; from 116 responses that were applicable to this component 9 themes were identified, see Table 12.

| Theme | Frequency |
|---|---|
| Usage | 23 |
| Distinction | 22 |
| Interface | 16 |
| Locations | 14 |
| Financial | 13 |
| Content | 12 |
| Relations | 8 |
| Searching | 6 |
| Entertainment | 2 |

*Table 12. Emergent themes and frequencies in the Second Life environment component.*

**Second Life: Usage**

From the 116 applications of a code used in this component area, 23 were as 'usage'. The 'usage' code was applied to response units which described how a respondent used Second Life. This code had the highest number of response units allocated to it across all of the framework component areas. Although generic, the use of this code results in a series of response units which when viewed as a whole portrays Second Life usage from amongst the respondents.

Example response units which had the 'usage' code applied to them are:

- *maybe 5-6hrs a wk*
  *i used to be addicted to this thing*
- *as a matter of fact , I made an other shape*
  *looking like my own body .. in rl*
- *its about 50/50 [alone or with friends in sl]*
  *we all have fairly busy rl*
- *London greeter...hang out here all the time. like to chat, bored*
  *easily...ermmmm what else*

Interestingly, the amount of response units attributed with 'usage' did not have an equally high number of other codes also applied to them. Other codes that were applied to response units with the 'usage' code were: peers, economic, accessories, opportunity, functionality, knowledge, cost, aversion, desire, taste, physical,

personality, avatar, summation, fear, judgement, meeting, frequency, network, distinction, financial, applications and also abbreviation.

**Second Life: Distinction**

The next highest occurrence of a code being applied to response units in this component area was that of the 'distinction' code. Here the code was applied to response units where the respondent made a statement which was indicative of the interaction between the real and virtual experience. The 'distinction' code was applied to response unit statements which were stating, or commenting on, an action of theirs to be performed for virtual world usage. Although similar in many ways to the 'real-life' code used in the interaction component area, the focus of which was on real world experiences, the 'distinction' code was used where the respondent is making a differentiation between the real and virtual domains.

Example response units which had the 'distinction' code applied to them:

- [problems with lag] *yeah...totally annoying :(*
  *ganna relog. Brb*
- *I think SL will be unstable for a few months, as they transition to HTTP delivery of textures, while leaving everything else through the LL protocol*

In the first example given the respondent is stating that they are about to logout of Second Life and then log back in. This type of action often helps when a user is having problems with in-world objects graphically resolving or with network lag.

Other codes used on response units which had the 'distinction' code were: peers, cultural, economic, economic (work), purchase, accessories, opportunity, employment, knowledge, rationalising, finances, desire, taste, social, perception, personality, deduction, summation, closeness, contempt, fear, lack, demands, locations, usage, relations, financial, content, applications, abbreviation and emoticon.

**Second Life: Interface**

When a respondent made a statement or commented on the way they were interacting with the Second Life interface, the response units was coded with 'interface'. This code is similar to the previous 'distinction' code. However, the focus here is with the interface itself. For example a response unit attributed with the 'interface' code was:

- *hard time - or pleasant time*
  *of course , I do not talk to everyone every day*

*some I do not remember and their profil helps me to keep in touch*

One of the features offered by the Second Life interface is the capability to keep personal notes about each avatar a user meets. This feature can be used to remind a user about the nature, character, likes and dislikes and such like of the people they meet with in-world. The example shown for the 'interface' code is essentially explaining how the interface aide-mémoire is used by that respondent. The response units which were given the 'interface' code were also given the taste, query, identification, deduction, frequency, streaming, abbreviation, highlight and emoticon codes.

**Second Life: Locations**

The 'locations' code was used 14 times where response units made a statement about a specific Second Life location or types of location. The nature of this code is a parallel to the 'geography' code used in the Broad environment component area. Whereas the 'geography' code was about geographic locations, the 'locations' code is about in-world places.

Examples of response units which were coded with 'locations':

- *yes there is a buddhist sim that I enjoy*
  *ts very relaxing and the music is nice*
  *its a nice community*
- *tips and free clothing stores*

Other codes which were applied to the response units were: peers, geography, cultural, functionality, aversion, entertainment, exploration, taste, query, summation, contempt, pleasure, fear, judgement, pastime, meeting, real-life, distinction, entertainment, relations, content, streaming, abbreviation and emoticon.

**Second Life: Financial**

Similarly named codes have been used in the Broad, Direct and Utility component areas. Here the 'financial' code was used when a respondent made a statement or commented upon how finances were used in-world or where alternative practices were used instead of finances. Therefore this code was used on response units which were about how the respondent earned or spent money in-world or alternative practices to earning or spending were stated. An alternative in this instance to earning money might be volunteering and for spending an alternative might be some form of barter.

Example response units which were given the 'financial' code follow:

- [greeting is a job?] *its voluntary*
- *with money*
  *lol*
  *but until now - I have earned my money on sl with classes - and shows*
  *I have had a model agency*

Response units which were given the 'financial' code were also coded with: employment, functionality, cost, finances, aversion, taste, perception, avatar, summation, contempt, fear, judgement, lack, demands, distinction, usage, content and abbreviation.

**Second Life: Content**

Where a respondent made a statement about their use of in-world content, the response unit was coded with 'content'.

Example response units which were coded with 'content', follow:

- *but my skin and clothes on this av are freebies thatI got when I first started*
- *no I bought the earings and braclet [last thing bought]*
  *oh i just thought they were cute*

Response units which were given the 'content' code were also coded with: economic, rationalising, aversion, desire, taste, personality, avatar, identification, contempt, pleasure, distinction, locations, financial, abbreviation and emoticon.

**Second Life: Relations**

The 'relations' code was used when a respondent made a statement concerning how they related with others in-world. Here respondents often contextualised the relationship explicitly as in 'hang out there with friends', or sometimes implicitly such as one response unit which is coded with 'relations' spoke about 'tips' whereby the respondent earned money in-world through interactions with others who would then leave some money.

Example response units which were coded with 'relations':

- *my friends... i know it's sl, but i've become as close to some of them as some friends in rl*
  *silly i know =P*
- *btw this was the annoying side of SL*
  *you can not have a bf - and talk to someone , without having problems*

The eight occurrences of this code to response units were shared with these other codes: peers, geography, entertainment, exploration, social, perception, closeness, contempt, pastime, meeting, demands, real-life, distinction, locations, streaming, abbreviation and emoticon.

**Second Life: Searching**

The 'searching' code was used with response units where a statement concerning exploration of Second Life was made. The six occurrences of this code were with response units which made statements about using the search feature Destination Guide provided in the Viewer interface or they were about exploring in-world locations.

For example:

- *yea...my friends and i think up random words and do a search for that word....first to come up with that word in the search, is the sim we go to lol*
- *i have found some cool sims on my own*

The response units which were coded with the 'searching' code were also coded with: functionality, exploration, entertainment, query, judgement, co-op, pastime, meeting, search, locations, entertainment, locations, relations, search, streaming and abbreviation.

**Second Life: Entertainment**

The 'entertainment' code was used in much the same way to the 'pastimes' code used for the broad environment component area, the 'entertainment' code in the hedonic component area and is similar to the 'usage' code in this component area. However, here only response unit statements which explicitly stated the use of Second Life or its features and locations were coded.

For example:

- *yea sometimes... depends on their sense of humor, etc*
  *i like to find the silliest/weirdest sims i can...and just check them out. some pretty entertaining stuff on here.*
  *amazing to think the time and thought that has been put into these places*

Response units coded with 'entertainment' here were also coded with: functionality, entertainment, exploration, entertainment, query, co-op, judgement, search, locations and emoticon.

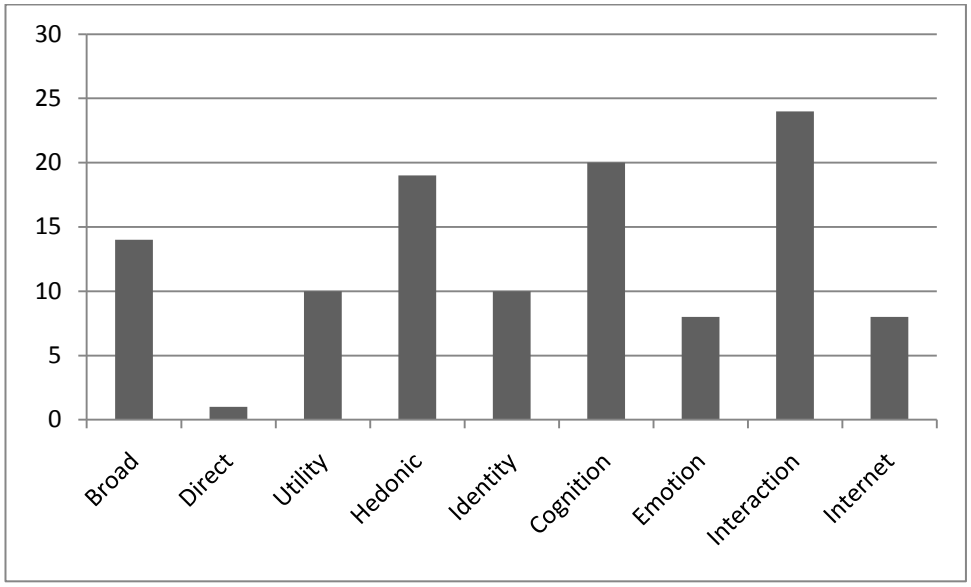


*Figure 19 Interrelation of the Second Life environment with other components.*

### 5.1.10. Internet

The **Internet** component of the framework had 8% of response units align with its description, from which 3 themes were identified as shown in Table 13. By paying attention to this component area, content creators in-world can better understand the use of online technology by their audience. This knowledge can be leveraged in order to provide better functionality and/or services for the audience. This can be achieved through better integration of other online services in a given content area.

| Theme | Frequency |
|---|---|
| Streaming | 7 |
| Applications | 6 |
| Availability | 3 |

*Table 13. Emergent themes and frequencies in the internet environment component.*

**Internet: Streaming**

The 'streaming' code was applied to response units where the respondent made a statement recognised by the researcher as a description of the use of streaming media technology. Typically at the in-world locations where video and/or music is offered, the use of streaming media technology is the method by which this is achieved. Further, with the release of Viewer 2, live web content can be displayed and interacted with in-world. Web content is delivered using the Hyper Text Transfer Protocol (HTTP) which uses the transfer of packets of information to make up the whole document. Web content in Viewer 2 is handled and treated in much the same way as video and audio content by Second Life.

Example response units that were coded with 'streaming' follow:

- *probably to my house =P*
  *hang out there with friends*
  *i have a friend that lives in ohio...we keep in touch in sl alot*
  *go to my little sl home and watch videos etc*
- *yes there is a buddhist sim that I enjoy*
  *ts very relaxing and the music is nice*
  *its a nice community*

Other codes applied to the response units with the 'streaming' code were: peers, geography, rationalising, entertainment, exploration, taste, taste, pleasure, judgement, pastime, meeting, real-life, locations, relations, interface, abbreviation and emoticon.

**Internet: Applications**

Of the 16 occurrences of a code used in this component area, six were as 'applications'. This code was applied to response units where the respondent made statements about the use of online services separate to Second Life. Four of the six response units coded with 'applications' were about alternate online technologies which enable communications.

Example response units that were coded with 'applications' follow:

- *btw I have skype to avoid these problems*
- *I will have to buy lindens soon*
  *and will use Paysafe card*
  *because I do not have a credit card*

Other codes applied to the response units with the 'applications' code were: peers, accessories, finances, distinction, usage and abbreviation.

**Internet: Availability**

Similar to the 'infrastructure' code used in the broad component area, the 'availability' code was used with response units where the respondent described their access, or lack thereof, to the Internet.

For example:

- *yes I dont have internet at work* [login to sl from home]
- *they really dont have them here* [internet cafes]
  *like they do in Europe*
  *I went to France a few years ago,and they had tons.*

Other codes used with the response units that were coded with 'availability' were: geography, economic (work) and infrastructure.

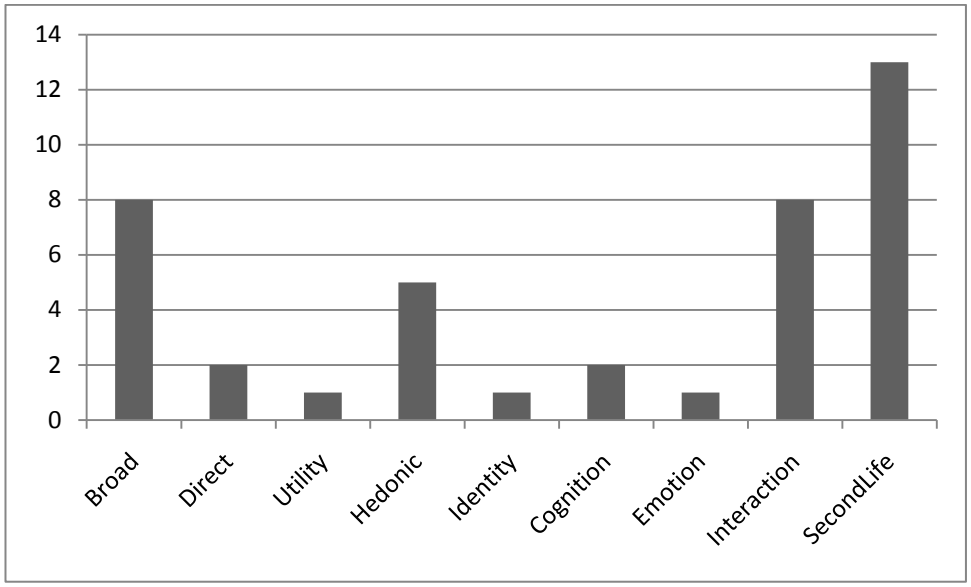


*Figure 20 Interrelation of the Internet environment with other components.*

### 5.1.11. Inline

Although 'Inline' is not a component part of the framework, it is included here as an indication of the number of response units that appeared in the component areas that used abbreviations, emoticons (smileys) and such like. Finally, it is relevant to note that there were 36 response units that contained abbreviations, these were predominantly the use of contractions such as rl, sl or lol to indicate 'real-life', 'Second Life' and 'laugh out loud'.

| Theme | Frequency |
|---|---|
| Abbreviation | 36 |
| Emoticon | 14 |
| Highlight | 5 |
| Extended | 4 |

*Table 14. Emergent themes and frequencies for the inline metric.*

There were 14 response units that contained some form of emoticon (Walther and D'Addario 2001) and four response units contained an in-channel adaptation to highlight either the user or a comment. These adaptations appeared as:

1. *important*

2. [14:19] Samanda [Surname]: <---- will use emerald till it dies

The second adaptation shown is a meta-linguistic sign and is indicative of an in-channel adaptation that is using the layout and functionality of the interface to express meaning. This example shows how in the Second Life chat interface a timestamp and avatar identifier are given before the message content, this is the left most portion of the example, shown in grey for clarity.

Further, the example shows how this interface design feature has been used differentiate this message content from others as well as replace the identifier 'I'. It should also be noted that the use of capitalisation and/or punctuation were often discarded by the interviewees, most likely in order to speed along their responses. In total 59 (31%) of the response units contained an in-channel adaptation.

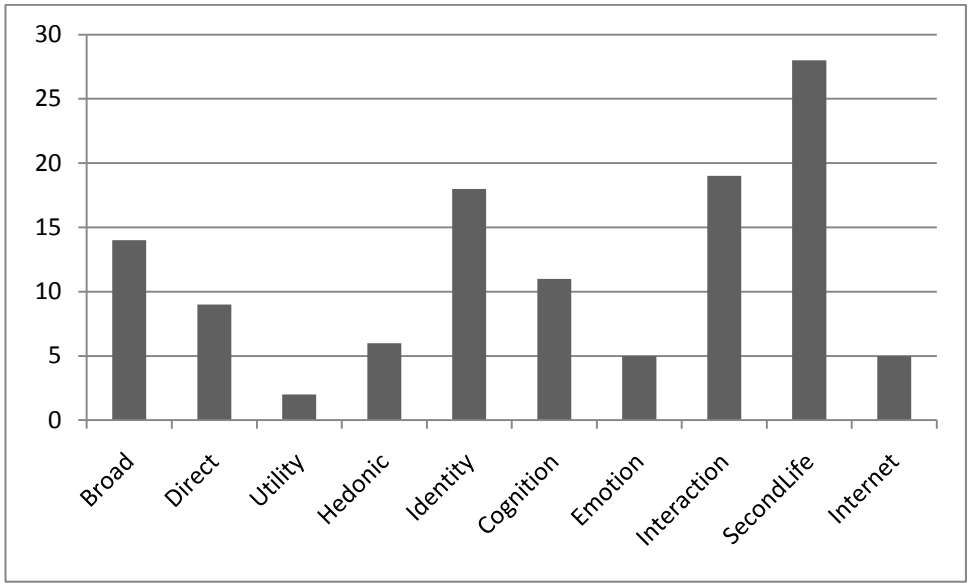


*Figure 21 Interrelation of the Inline environment with other components.*

## 5.2. Refined framework

This section is a discussion about how the initial framework investigated in the prior part of this chapter evolved further based on the findings from, and the experience of, the analysis of the responses to the interviews.

Each of the proceeding sections 5.1.01-5.1.10 included a chart, figures 11-20, showing the amount of response units coded in other component areas which matched response units coded in the given component area being detailed. Section 5.1.11 is not included here for the reasons detailed in that section, namely that it was included purely as an indication of the response units that appeared in the component areas that used abbreviations, emoticons and such like.

As such the data from the charts in figures 11-20 were brought together as a cross-tabulation which is table 15. This cross-tabulation gives an oversight to the data gathered in the proceeding sections which could not be gained from the individual charts. Therefore table 15 can be perceived as a 10x10 matrix representing 100 points, 10 of which are self-referential and thus discounted.

| | Broad | Direct | Utility | Hedonic | Identity | Cognition | Emotion | Interaction | Second Life | Internet |
|---|---|---|---|---|---|---|---|---|---|---|
| Broad | -- | 0 | 5 | 1 | 9 | 2 | 1 | 18 | 21 | 9 |
| Direct | 0 | -- | 11 | 0 | 2 | 2 | 2 | 8 | 6 | 2 |
| Utility | 5 | 11 | -- | 3 | 3 | 3 | 0 | 11 | 18 | 2 |
| Hedonic | 1 | 0 | 3 | -- | 7 | 4 | 3 | 11 | 21 | 3 |
| Identity | 9 | 2 | 3 | 7 | -- | 8 | 4 | 13 | 22 | 2 |
| Cognition | 2 | 2 | 3 | 4 | 8 | -- | 3 | 10 | 11 | 0 |
| Emotion | 1 | 2 | 0 | 3 | 4 | 3 | -- | 6 | 14 | 1 |
| Interaction | 18 | 8 | 11 | 11 | 13 | 10 | 6 | -- | 34 | 8 |
| Second Life | 21 | 6 | 18 | 21 | 22 | 11 | 14 | 34 | -- | 13 |
| Internet | 9 | 2 | 2 | 3 | 2 | 0 | 1 | 8 | 13 | -- |
| Total | 66 | 33 | 56 | 53 | 70 | 43 | 34 | 119 | 160 | 40 |

*Table 15. Interrelation of all components.*

From the remaining 90 points only the left or right side of the self-referential divide was used as the two sides mirror each other. This left 45 points as indicators of component interrelation. Only 4 points show a zero value with the remaining 41 points, or 91%, having a value of 1 or more. Indeed, table 15 shows that the majority of components interrelate with all of the others, with the exception of: Broad-Direct, Direct-Hedonic, Utility-Emotion and Cognition-Internet. Further, all of the components interrelate with other components in the framework.

Furthermore, what became apparent during the course of the interviews conduct in-world and the subsequent analysis was that the framework required further development. This was apparent especially with regard to some of the terminology used for the framework components. The main areas under consideration here were the terms ‘broad’ and ‘direct’. The term direct environment was originally envisioned to encapsulate the current place the user was in both physically and mentally, the term broad environment was an extrapolation of that concept to include those factors that were elsewhere or tangential.

For example, the choice of code placement into the broad or direct environment for response units that made statements about rainfall were found to be particularly difficult for the researcher. While the broad environment, as described in section 4.1, related to the ‘outside world’ where the rain was, there was a direct effect on respondents. In this context the change to latent and immediate environments makes this problem less difficult. With this example the rainfall has an immediate effect on the respondent.

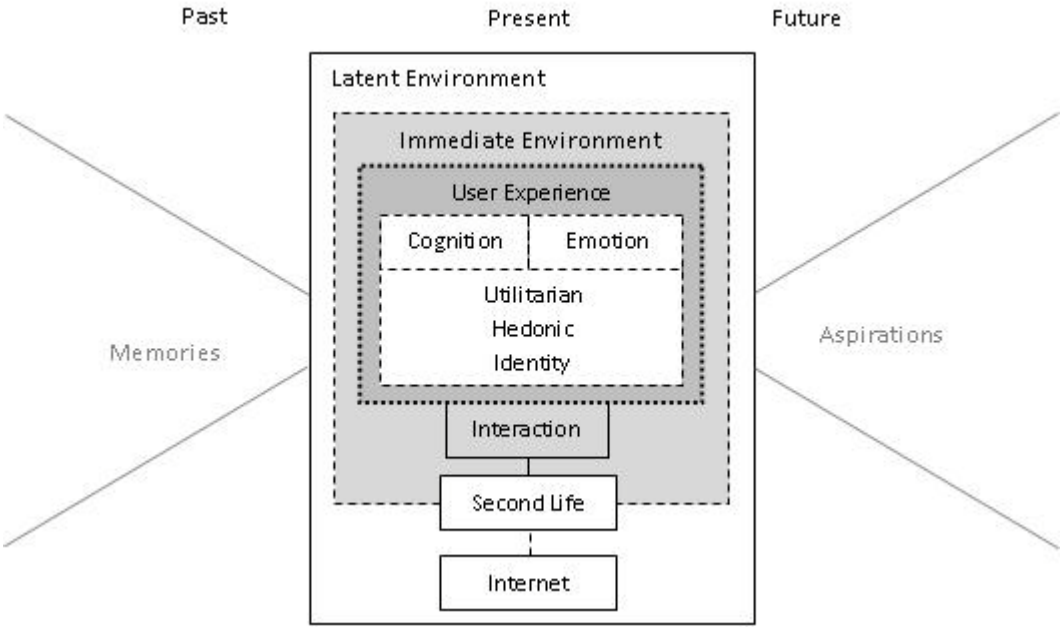


*Figure 22 The refined framework as a consequence of the primary data analysis.*

The subdivision of the user experience component has already been described (sections 4.3 and 5.1), through the inclusion of hedonic, utilitarian and identity components. Another difficulty that arose during the analysis was that there was no clear distinction available in the framework to differentiate responses in terms of understanding the user's past experiences, current situation or future aspirations. Therefore the refined framework, figure 22, has these adaptations incorporated into it.

# 6 Component cross-check experiment

Having explored Second Life users' experiences of the platform in-world, further investigation was conducted focusing on the interrelationship between the Second Life and Internet components of the framework. The approach taken here is novel with regard to search engine trend analysis and had the objective to see if there was any correlation between the number of websites that pertain to a Second Life location and the amount of time spent at that location in-world by those that visit it.

It should also be noted that this experiment was conducted with a view to being a quantitative triangulation cross-check validation of the framework investigation given in Chapter 5. Specifically this cross-check is focussed on the relationship of the user with the Second Life and Internet components within the Immediate and Latent environments. The use of triangulation, as Cohen et al. (2005) point out, is that: "Triangulation is a powerful way of demonstrating concurrent validity, particularly in qualitative research".

The hypothesis here was that users of Second Life generate content not only in-world but also elsewhere online as described in section 4.7 with regard to machinima. Therefore, search engine technology could be used to investigate the amount of content generated, in particular about a given in-world location. Further, that an in-world metric could be used for a given location for comparison with the results from the search engine queries. This hypothesis was based on the assumptions that the search engines used would offer up accurate and consistent data for the queries conducted; and that there was a significant amount of content generated by Second Life users pertaining to the various locations available in Second Life.

As stated in Chapter 1, a contribution of this research study was this novel approach to search engine trend analysis. Typically, the approaches taken for trend analysis using search engines were focused on the volume of searches for a given keyword or phrase (Lui, 2011). Through the analysis of search volume, the researcher can determine the amount of interest shown for a given keyword or phrase at a particular time. This is

essentially the approach that was taken by Ginsberg et al., (2009) to identify influenza outbreaks through the search patterns adopted in areas affected. Choi and Varian (2009) took a similar approach analysing search behaviour regarding sales for motor vehicles and homes among others. However, the approach taken here has a fundamentally different basis. The focus here is on the volume of websites returned pertaining to a search phrase as opposed to the volume of searches made. In this context the volume of returned websites can be perceived as indicative of the amount of interest generated by a given Second Life location. Further, this approach can be seen as an indicator of user satisfaction (either in a positive or negative sense) as the websites returned by the search engine are essentially documents that relate to a given Second Life location where someone has taken the necessary time and the necessary effort to generate that document.

During late 2010 all of the locations presented on the 'Destination Guide' pages of the Second Life website were searched against three major website search engines: Google, Bing and Yahoo. The 'Destination Guide' is a listing of locations within Second Life that Linden staff believe to be the best and most popular locations to visit. There were 1484 entries in the 'Destination Guide' each of which was queried on the search engines, see Appendix 8. Each location name was encapsulated with quotation marks as well as the name Second Life, for example: "Freebie Island" "second life". Additionally any 'adult content' filtering available on each search engine was turned off in order to gain the most relevant results. This choice was made due to the mature theme of some of the Second Life locations and therefore probably on websites that pertain to them. The use of "second life" in quotation marks ensured that only websites that contained the phrase 'second life' were returned in the results from the search engines as opposed to websites that contained instances of the word 'second' and the word 'life' somewhere in their content. The use of quotation marks around the location name was used for the same reason.

Each of the three search engines were interrogated with searches for each of the 1484 'Destination Guide' locations. For each search conducted on each of the search engines the number of websites returned as 'results' was recorded. In addition the search engine results page was archived by copying the underlying hypertext mark-up language of that page. The number of websites returned from the search engines for each search was then ordered numerically from highest to lowest. The highest, lowest and middle five results from each search engine was then taken to be compared with their in-world location, see

tables 16-24. The reason for taking five results was used as a means of averaging the results returned. Further this was done in order to gain a clearer perspective on whether or not this approach could be used as an indicator of correlation between the amount of generated web based content and the amount of time spent by visitors at a given location.

Once the highest, lowest and middle five search engine query results had been determined, the corresponding locations were travelled to in-world and the 'traffic' metric recorded. The traffic metric is defined on the Second Life site as: "the cumulative minutes spent on the parcel by all visitors to the parcel within the previous day". In this manner a comparison can be made between the volume of websites writing about a location and the amount of time spent by avatars at those in-world locations. Tables 16-24 show in the left most column the search engine used and the position from the 1484 numerically ordered search results. The second column named 'Location' shows the corresponding name of given locations as stated in the 'Destination Guide'. The 'Pages' column shows the number of websites returned from the search engine being queried and the right most column named 'Traffic' shows the value given in second Life as the traffic metric for the named location when visited in-world. Finally the bottom row shows the average number of websites returned from the search as well as the average of traffic or cumulative minutes spent at those locations.

## 6.1. Searches using Google

Table 16 shows the locations which received the fewest search results from the Google search engine. It should be noted that positions 2 and 3 are duplicate locations. These duplicates occur when a location is entered into the 'Destination Guide' under different categories. Further, the location could not be found in-world, hence the 'not applicable' or 'na' entered for them in the Traffic column. Position 5 in this table has the lowest traffic metric of the five locations even though it shares the highest number of search engine query results with position 4.

| Google | Location | Pages | Traffic |
|---|---|---|---|
| 1 | Paris Bourbon Island - Champs-Élysée | 5 | 319 |
| 2 | Paris Bourbon Island - Bourbon Welcome | 5 | na |
| 3 | Paris Bourbon Island - Bourbon Welcome | 5 | na |
| 4 | Portuguese Republic in SL | 7 | 281 |
| 5 | Wowww! Special Skins | 7 | 85 |
| | Average | 5.8 | 137 |

*Table 16. Google lowest five.*

Table 17 shows the middle five search engine queries from Google. Here position 745 had no in-world location associated with the 'Destination Guide' entry even though it showed the highest number of query results in this table. The IEEE Island location, position 743, showed a lower traffic metric than any of the other visited locations in this table.

| Google | Location | Pages | Traffic |
|---|---|---|---|
| 741 | Aster's Builts | 825 | 838 |
| 742 | St. George Church | 826 | 604 |
| 743 | IEEE Island | 847 | 77 |
| 744 | Rendervisions Isle | 855 | 808 |
| 745 | NoCtUrNiA | 868 | na |
| | Average | 844.2 | 465 |

*Table 17. Google middle five.*

Here in table 18, positions 1481 and 1482 are duplicated locations, due to the same location being entered into the 'Destination Guide' under different categories. This table shows the highest five search engine query results from Google for all of the 'Destination Guide' locations. The virtual location for position 1484 could not be found, hence the 'na' entry in the Traffic column of this table. Also, position 1483 shows an interesting outlier by having a traffic metric of only 40. This traffic metric is lower than all of the visited in-world locations from table 16 which showed the lowest search engine query results and yet the location had one of the very highest search engine query results in table 18. Here both the traffic metric and the search engine query results were repeated to confirm the original numbers.

| Google | Location | Pages | Traffic |
|---|---|---|---|
| 1480 | Social Scene | 97800 | 1712 |
| 1481 | Second House of Sweden | 98200 | 479 |
| 1482 | Second House of Sweden | 98200 | 479 |
| 1483 | Pirats Art Network | 98500 | 40 |
| 1484 | 03 | 184000 | na |
| | Average | 115340 | 542 |

*Table 18. Google highest five.*

## 6.2. Searches using Bing

Table 19 shows the locations which received the fewest search results from the Bing search engine. Unfortunately position 3 and 4 had no corresponding virtual location in so far as the Second Life location described in the 'Destination Guide' was no longer at the given location. Therefore a traffic metric for those locations could not be obtained. Also, with regard to the traffic metric, the values given in this table are much higher than for those in the similar 'lowest five' tables for both the Google and Yahoo search engine query results. Indeed the average of the traffic metric in this table far exceeds that of the average traffic metric in both the Google and Yahoo highest five tables.

| Bing | Location | Pages | Traffic |
|---|---|---|---|
| 1 | The Fly Electro Club | 1 | 1320 |
| 2 | Islet of Gra' Cairdeas | 1 | 7791 |
| 3 | Wolfes Pond First Responders Sim | 1 | na |
| 4 | The Dirty Little Secret Gridwide Hunt | 2 | na |
| 5 | Cliff's Beach | 2 | 1337 |
| | Average | 1.4 | 2089.6 |

*Table 19. Bing lowest five.*

The middle five selections from the Bing search engine query results are shown in table 20. Here the number of sites in the results from the search engine queries, the Pages column, is almost uniform with only one entry showing 71 and the remaining four showing 73. However, the results from the traffic metric shown in the Traffic column vary considerably with both the CyberWatch and the Testis Tour locations receiving less than 50 and the Da Vinci Gardens and the Chinese Island locations both receiving in

excess of 10, 000. This kind of variance was not seen in the middle five locations from Google, Table 17, but is seen in the Yahoo middle five, Table 24.

| Bing | Location | Pages | Traffic |
|---|---|---|---|
| 741 | Alpha Dogs | 71 | 342 |
| 742 | Da Vinci Gardens | 73 | 16602 |
| 743 | CyberWatch | 73 | 26 |
| 744 | Testis Tour | 73 | 43 |
| 745 | Chinese Island | 73 | 10124 |
| | Average | 72.6 | 5427.4 |

*Table 20. Bing middle five.*

Note that Bing positions 1481, 1482 and 1483 are duplicate locations, again occurring due to the same location being entered into the 'Destination Guide' under different categories. Of interest here is the fact that all of the locations in table 21 are all for Second Life locations that relate to physical geographical locations, that is, Africa, London and Australia. It could be argued here that many of the websites that contributed to the values shown in the Pages column are not specifically about the corresponding Second Life locations at all but the physical geographic locations instead. However, the results in the Traffic column are substantial ranging from 9830 for the Australia location through to 23927 for the London Location. So here the lowest traffic metric reading is greater than the average of the traffic metric in the lowest or middle five positions shown for the same search engine.

| Bing | Location | Pages | Traffic |
|---|---|---|---|
| 1480 | Africa | 371000 | 18057 |
| 1481 | London | 468000 | 23927 |
| 1482 | London | 468000 | 23927 |
| 1483 | London | 468000 | 23927 |
| 1484 | Australia | 522000 | 9830 |
| | Average | 459400 | 19933.6 |

*Table 21. Bing highest five.*

## 6.3. Searches using Yahoo

Table 22 shows the locations which received the fewest search results from the Yahoo search engine. The 'Destination Guide' location that saw the least number of results from the query on the Yahoo search engine conversely had a significantly higher average traffic metric in comparison with the Google lowest entries that make up Table 16.

| Yahoo | Location | Pages | Traffic |
|---|---|---|---|
| 1 | La Città Perdu | 1 | 5695 |
| 2 | Portuguese Republic in SL | 2 | 281 |
| 3 | Paris Bourbon Island - Champs-Élysée | 3 | 319 |
| 4 | The Washout and The Privy | 3 | 22 |
| 5 | Wowww! Special Skins | 3 | 85 |
| | Average | 2.4 | 1280.4 |

*Table 22. Yahoo lowest five.*

The middle five selections from the Yahoo search engine query results are shown in table 23. An interesting search engine anomaly can be seen in this table, note that position 742 and 744 relate to the same in-world location but show different results in the Pages column. Again this duplication is due to the same location being entered into the 'Destination Guide' under different categories. However, here the Yahoo search engine shows a different result for the number of websites found for the same query.

| Yahoo | Location | Pages | Traffic |
|---|---|---|---|
| 741 | Vamporium | 622 | 5237 |
| 742 | Kannonji Zen Retreat | 623 | 4079 |
| 743 | La France Pittoresque | 624 | 38429 |
| 744 | Kannonji Zen Retreat | 626 | 4079 |
| 745 | Petals on the Wind | 626 | 60 |
| | Average | 624.2 | 10376.8 |

*Table 23. Yahoo middle five.*


*Figure 23 Differences in search engine results.*

Figure 23 shows the Yahoo search engine query results pages for both searches and with both amounts of results showing near the bottom left of each image. This would indicate that the search engine query results are dynamic even when the same query is run after only a short period of time.

Further, the result shown in the traffic column of table 23, for the La France Pittoresque location is over 38,000 while none of the other locations in this table exceeded 5,237. Also of note here is that the Petals on the Wind location is shown in this table with the joint highest amount of 626 being recorded in the Pages column, while the value of 60 is shown for the traffic metric which is by far the lowest amount in the Traffic column.

Table 24 shows the highest five search engine query results from the Yahoo search engine for all of the 1484 'Destination Guide' locations. Unfortunately the very highest query results amount was for the 03 location but this location was not reachable in-world. The second highest query results was for a location, Ghost Town, yielded the lowest amount in the Traffic column in this table.

| Yahoo | Location | Pages | Traffic |
|---|---|---|---|
| 1480 | Embryo | 90400 | 952 |
| 1481 | Son!a | 94100 | 6330 |
| 1482 | Second Style Magazine | 96300 | 1304 |
| 1483 | Ghost Town | 97500 | 68 |
| 1484 | 03 | 211000 | na |
| | Average | 117860 | 1730.8 |

*Table 24. Yahoo highest five.*

## 6.4. Concluding remarks

The locations that could not be found in-world and marked as 'na' in Traffic columns in tables 16-24, were most likely discontinued or re-developed. The reason for this occurring may well be due to revenue generation issues, or more precisely lack thereof. If, hypothetically, a location is not generating enough revenue or is not attracting visitors, the owner may re-design the location or give it up. Owning virtual land in Second Life can be costly and owners of under-performing locations have been known to sometimes enter their location to the 'Destination Guide' in the hope of further interest, visitors and/or income from that listing. Further, it could be the case that the location owner may decide to scrap the location or re-design it if the initial listing did not generate a significant amount of interest, visitors and/or income. The location, however, remains listed in the 'Destination Guide'.

In conclusion, a novel approach to search engine trend analysis has been demonstrated. Typically trend analysis is conducted with a focus on the number of queries made whereas the approach demonstrated here was focussed on the number of results returned for a given query. Further, the objective to see if there was a relationship between the number of websites that pertain to a Second Life location and the amount of time spent at that location by those that visit it can be seen in tables 16-24. The average traffic results from tables 16-24 indicate that the average Google and Bing page returns show in-world popularity being linked to the number of websites mentioning a given location. However further research is required as the traffic metric is only for the previous day and websites are, in this context, far more persistent. Therefore a further avenue of investigation with micro-blogs such as Twitter needs conducting.

# 7 Discussion

This chapter is focused on the drawing together of the different experiments, the approaches taken in conducting them and the literature which pertains to them as described in the proceeding chapters.

Initially the researcher saw the manner in which a 'holistic' approach could be taken in the work by Hersberger et al. (2007), see section 2.4.1 and the total customer experience in the work by Rowley (1999), as described in section 2.2. These approaches being taken to the creation of a novel framework in preference to those already available for the reasons described in section 2.2 such as the inability of the Kano model or of Servqual to identify deep seated or broader issues influencing a respondent such as physiological or emotional matters.

Both quantitative and qualitative approaches have been used within this research study, for example, Chapter 3 explained and evaluated early experimentation carried out by the researcher. The quantitative approach described there for investigating group size, membership and joining rates turned out to be not feasible for further study due to:

- the requirement to know the core purpose of a group before any kind of comparison or predictability could be ascertained
- the lack of control over Second Life mechanisms such as the metrics used to determine search results

Further, with both the web based survey and the in-world artefact, initial user testing highlighted issues to the approach being taken and further survey and technical development of the artefact were required to resolve those issues.

The experience of using the quantitative approaches, as described in Chapter 3, during early experimentation led to the requirement for the researcher to re-evaluate the approach to further experimentation. Ultimately this initial experimentation, as well as

the reflective procedure described in the initial part of Chapter 4, was the basis from which the framework was created but evaluated primarily using a qualitative approach as described in Chapter 5. For example, the experience of the software interface gained while investigating group size, membership and joining rates enabled the researcher to know that a traffic metric was available in-world as used in the cross-check experiment described in Chapter 6; also the total customer experience survey designed for the web based survey and in-world artefact was the basis upon which the semi-structured interviews took form.

Quantitative elements were then again used in Chapter 5 for triangulation. These quantitative elements in Chapter 5 were focussed on the emergent theme frequencies as shown in tables 3-13 and the interrelations of response units in a given framework component with other components of the framework (see figures 11-20). Table 15 then shows an overview of the interrelationships of response units originally described in figures 11-20.

Within Chapter 5 an explanation was given as to how data was collected and interpreted using the framework as a basis. Further, the use of the framework to comprehend the data collected through semi-structured in-world interviews was detailed. The framework was then refined as a consequence of evaluation of the data interpretation process. Then, Chapter 6 detailed how further experimentation using a novel approach, with the framework as a basis, was conducted. It was shown that three search engines were interrogated with the names of a variety of in-world locations. The highest, lowest and middle results were averaged and checked against in-world patronage by Second Life users. This resulted in two of the three search engines averaged results were matched with in-world patronage.

Indeed, as the averaged Google and Bing page returns showed in-world popularity being linked to the number of websites mentioning a given location, the use of triangulation as a means to validate the framework was successfully shown. This is the case as the framework specifies a bidirectional link between the Second Life and Internet components which are connected to the Latent Environment and the User Experience via the Interaction and Immediate Environment components. Essentially then, the framework can aid in the understanding of not only the Second Life experience but of an online consumer satisfaction experience in general. To use the framework to analyse and further

understand consumer satisfaction perceptions of a given online setting, for example Facebook, the Second Life component would require exchanging with that of the new online setting to be investigated.

In conclusion, the findings from Chapters 5 and 6 give validation or credence to the 'holistic' nature of the framework developed and the total customer experience approach taken as first described in Chapter 2, see section 2.2. It should be noted also that the results from Chapters 5 and 6 when perceived through the lens of triangulation, further add weight to the embodiment perspective taken in this research study. Essentially the postulation here, from these findings, is that experienced reality is irrespective as to whether that reality is perceived virtually or actually.

# 8 Conclusion and further work

This Chapter reviews the approach taken to the creation of a framework for eliciting consumer satisfaction using the context of the social virtual world Second Life.

The aim of this investigation, as given in the introductory Chapter, was to identify how the elicitation of consumer behaviour and perceptions, focussed on consumer satisfaction, within the context of a social virtual world could be achieved. Ultimately this aim was met through the creation of a framework which was used for the analysis of individual and group-based interviews conducted in-world with users of Second Life. The approach taken to meeting this aim was through the investigation of the following objectives: how consumer satisfaction is defined, understood and measured; how virtual worlds function as both a platform and a product; how users typically perceive their experiences in virtual worlds; and how consumer satisfaction metrics can be translated into a virtual environment.

## 8.1. Summary of objectives met

This section is a summarisation of how the objectives specified in the introductory Chapter were addressed.

With regard to how consumer satisfaction is defined, understood and measured, Chapter 2 gives an analysis and evaluation of the most relevant literature pertaining to consumer satisfaction in a virtual world setting. Further, understanding of a key business concept such as consumer satisfaction among the user community is a necessity and with this in mind, a framework has been created. The creation of the framework is based on prior research, see Chapter 3, as well as the relevant literature such as that by Rowley (1999), Zhou et al. (2010), by Lehdonvirta (2009), Luz et al. (2008) as well as Giese and Cote (2002) amongst others.

Regarding the objective of how virtual worlds function both as a platform and a product; the initial framework created needs to be revisited. The initial framework identified seven components that are interrelated and provide the context of the user experience of Second Life, see Chapter 4. The approach taken by the framework allows it to be used as a means to consider the user experience of Second Life both as a product and a platform. Therefore when Second Life is perceived as a product, the framework given here allows the identification of areas of attraction and factors that cause aversion amongst the user community. With these factors identified the usability, functionality and such of Second Life can be developed enabling users to better pursue their own objectives. Also, in regard to Second Life as a platform for operating an in-world business, the framework allows the identification of attraction and aversion factors among the intended audience. With these factors identified the business operator could implement functional or process changes to increase attraction and/or decrease aversion as necessary. Also, the identification of attraction and aversion factors through the use of the framework can be applied to in-world spaces. Here both Linden Lab and in-world business operators could engineer or adapt in-world spaces to further engender the mood of satisfaction amongst their users.

The next objective was focussed on how users typically perceive their experiences in virtual worlds. Here, using the framework as a starting point, interviews were conducted from among the user community, see Chapter 5. A semi-structured approach was taken for the interviews in order to explore the depth of experiences available for elicitation from the interviewees. The data gathered from these interviews was then analysed in the context of the framework components. Emergent themes from the analysis revealed that further aspects of the user experience needed to be considered. Therefore the framework required refinement as a consequence of those emergent themes and now the framework incorporates a temporal aspect as well as a finer granularity to understanding the factors that affect consumer satisfaction with Second Life.

Lastly, the objective about how consumer satisfaction metrics can be translated into a virtual environment was investigated through an evaluation of the literature pertaining to consumer satisfaction in a virtual world setting, see section 2.2. This demonstrated the rationale to move from traditional models of consumer satisfaction to more experimental ones (Nyeck, 2002; Rowley, 1999). This rationale led to some initial experimentation, as described in section 3.2, which proved that a web based survey implemented through an

in-world artefact resulted in a mechanism capable of gathering consumer satisfaction data.

## 8.2. Major and minor contributions

The following describes the major and minor contributions made. Essentially these contributions came from the creation and development of a novel framework and from the novel approach taken to search engine trend analysis.

Therefore, the major contribution of this research study has been the creation of a novel framework for eliciting consumer satisfaction perceptions in a virtual world environment. This framework provides an improved comprehension of consumer satisfaction perceptions from a user community based in a virtual environment, in comparison to other approaches used for understanding consumer satisfaction and/or virtual communities. The claimed improvement in comprehension is due to the 'holistic' nature of the framework developed, insofar as it takes into account the many and varied influences that affect consumer satisfaction perception in the physical, and by extension, the virtual realms. The framework offered here then is derived from a series of semi-structured interviews conducted in-world using a Straussian Grounded Theory approach. By noting the instances of sections of individual interviews that appeared in more than one element of the framework, the interrelationship between multiple elements can be seen more clearly.

The minor contribution of this research study has been the novel approach to search engine trend analysis. Typically, the approaches taken for trend analysis using search engines were focused on the volume of searches for a given keyword or phrase (Lui, 2011). Through the analysis of search volume, a researcher can determine the amount of interest shown for a given keyword or phrase at a particular time. For example, Ginsberg et al., (2009) used this approach to identify influenza outbreaks based on the search patterns adopted in areas affected. However, the approach taken here has a fundamentally different basis. The focus here is on the volume of websites returned pertaining to a search phrase as opposed to the volume of searches made. In this context, by focussing on the volume of returned websites, the results can be perceived to be indicative of the amount of interest generated by a given Second Life location. Furthermore, this approach can be seen as an indicator of user satisfaction (either in a

positive or negative sense) as the websites returned by a search engine are essentially documents that relate to a given Second Life location where someone has taken the time and the effort to generate that document.

## 8.3. Methodology reflection

The philosophical stance of the researcher has been that of embodied mind theory with a Grounded Theory approach taken to the experiments conducted. A Glaserian Grounded Theory approach was taken with initial experimentation which took quantitative methods as their basis. However for the reasons explained in section 3.2.4 this approach was not appropriate for further development. Therefore a Straussian Grounded Theory approach was adopted for the experimentation conducted in developing the elicitation framework, as described in Chapter 5, where a primarily qualitative approach was taken. On reflection, the influence on the researcher by the work of Rowley (1999) was a major contributing factor to the transition from Glaserian to Straussian Grounded Theory in this research. Primarily this was due to the use of total consumer experience metrics from the corporate/management domain being translated into a framework for a muesology investigation.

## 8.4. Further work

Through conducting interviews with Second Life users in-world and categorising the responses in alignment with the framework (as shown in Table 3), both platform and product developers can better understand their audience needs and motivations. Addressing those needs and motivations would be relevant to that audience.

Therefore, any implementation of functionality, aesthetics, usability and so on based on this research would be customised or bespoke to the requirements of that audience. Specifically, any investigation along these lines should be particularly looking for patterns in their results as an indicator of areas for further development.

For example, a Second Life store owner could interview a number of store patrons as well as general Second Life users. Applying interview responses to the framework, can give the store owner vital business intelligence. It would be particularly useful for the store owner to compare and contrast the results from both sets of interviews, see Hood (1993).

This approach of interviewing patrons as well as others is to gain a deeper understanding of why those patrons frequent that store and why others may not. Further this approach would identify how to improve the store for those that do frequent it and to attract those who as yet do not.

One issue that had become apparent during the development of the framework was that it could in fact be used to consider a much wider variety of social interaction within online environments. Indeed with the growth in recent interest of virtual worlds by mainstream games console developers such as Microsoft (Xbox 360 Experience) and Sony (PlayStation Home) the framework described is flexible enough to be used for a variety of internet based platforms.

To this end the framework can be adapted by replacing the Second Life component with a different component, for example, the browser based virtual environment 'ourWorld'[26] which is aimed predominantly at the teenage market. However, the appropriateness of this type of adaption is yet to be tested. Here it should be noted that using the framework as guidance for investigating consumer satisfaction is particularly important to appropriately identify needs and motivations when an intended audience is deemed vulnerable.

With regard to the generalisability of the framework developed, as previously described in Chapter 7, the framework can aid in the understanding of not only the Second Life experience or that of a given virtual world as given in the preceding paragraphs but of an online consumer satisfaction experience in general. In this case to understand consumer satisfaction perceptions in a given online setting, for example Facebook, the Second Life component of the framework would require exchanging with that of the new online setting to be investigated.

Further, Grounded Theory as methodological approach to the investigation of virtual world experience has been conducted by others, for example, Oliver and Carr (2009) and more recently MacLennan (2012). Oliver and Carr (2009) explored the educational potential of virtual worlds with a focus on World of Warcraft as the virtual world investigated. While Mclennan (2012) looked at the information retrieval potential in the design of virtual worlds and also investigated user preferences to that design from a

[26] See: http://ourworld.com

library services perspective.

The novel search engine trend analysis approach described in Chapter 6 can be used as a primary method for investigating popularity. In this research study this trend analysis method was used as a measure against an in-world metric showing the number of visitors to a given location. However, the in-world metric can be replaced with another metric or even with a calendrical measure of the passage of time. Indeed an interesting experiment would be to use the this novel approach to trend analysis against the more traditional approach such as that taken by Ginsberg et al., (2009) or by Choi and Varian (2009), as described in Chapter 6.

## 8.5. Conclusion

The aim in developing this framework was to understand the complex and inter-related factors that affect the use of Second Life, from the perspective of consumer satisfaction.

In this investigation a framework for eliciting consumer satisfaction perceptions in the context of the social virtual world Second Life has been created and developed. This was undertaken as the significance of virtual worlds is increasing, as can be seen in their uptake by leading consumer technology developers (Lehdonvirta, 2009).

Moreover, social virtual worlds are employed to develop a sense of community among users (Lehdonvirta, 2009). The in-world Second Life environment is made up from a complex of unit parts having distinctive traits and addressing different user needs, such as: role-play, shopping, socialising or education. The framework developed in this research is a means to understand the factors involved that affect consumer satisfaction in the use of Second Life either as a consumer product from Linden Lab or as vendor platform by those who operate a commercial or not-for-profit organisation in-world. Indeed, this framework can be elaborated on to investigate consumer satisfaction not only in Second Life but other internet based social virtual worlds as well.

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# *Appendices*

All of the Appendices can be found on the accompanying CD.

## Appendix 1 Published work

Bessis 2009

Bessis 2011

Shukla 2008

Shukla 2009a

Shukla 2009b

Shukla 2011a

Shukla 2011b

## Appendix 2 Initial experimentation data

Group Size Searches (Folder)

Group Joining Cleansed

Group Relate Cleansed

Group Size

## Appendix 3 Mueseum surveys

British Museum Survey

Erewash Museum Survey

Lutz Museum Survey

## Appendix 4 Survey questions

Survey Questions

## Appendix 5 Artefact scripts

Server Scripts Raw (Folder)

SL Scripts

Web Scripts

## Appendix 6 Weighted response data

TCE Metrics Translation

Weighted response testing cleansed

## Appendix 7 Chat logs and coding

Thematic Coding

Group Cleansed

Participant 1 Cleansed

Participant 2 Cleansed

Participant 3 Cleansed

Participant 4 Cleansed

## Appendix 8 Search Engine Data

Search Results Raw Data (Folder)

Search Engines Data