A methodology for developing Second Life environments using case-based reasoning techniques

This item was submitted to Loughborough University's Institutional Repository by the/an author.

Additional Information:

• A Doctoral Thesis. Submitted in partial fulfilment of the requirements for the award of Doctor of Philosophy of Loughborough University.

Metadata Record: https://dspace.lboro.ac.uk/2134/21491

Publisher: © Ahmad Fawzi Shubati

Rights: This work is made available according to the conditions of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (CC BY-NC-ND 4.0) licence. Full details of this licence are available at: https://creativecommons.org/licenses/by-nc-nd/4.0/

Please cite the published version.
A METHODOLOGY FOR DEVELOPING SECOND LIFE ENVIRONMENTS USING CASE-BASED REASONING TECHNIQUES

By

Ahmad Fawzi Shubati

A Doctoral Thesis

Submitted in partial fulfillment of the requirements for the award of

Doctor of Philosophy

Of

Loughborough University

December 2010
Abstract

Launched in 2003, Second Life is a computer-based pseudo-environment accessed via the Internet. Although a number of individuals and companies have developed a presence (lands) in Second Life, no appropriate methodology has been put into place for undertaking such developments. Although users have adapted existing methods to their individual needs, this research project explores the development of a methodology for developing lands specifically within Second Life.

After researching and examining a variety of different software methods and techniques, it was decided to base this research project methodology on Case-Based Reasoning (CBR) techniques, which shares a number of synergies with Second Life itself. With some modifications, a web-based system was designed based on CBR to work in accordance with Second Life.

Collecting and analyzing the feedback for the first version of the web-based system identified the adjustments and improvements needed. Therefore, from tracking its progress against previous specifications and future activity, an updated version of the CBR web-based system covering the latest changes and improvements of the tool was introduced. In addition to this, new functionalities have been added in the improved version in order to refine and develop the original prototype to become a highly effective SL development tool.

New feedback platforms have been provided to facilitate the use of the system and to obtain results which are more closely related to the users’ recommendations. Through the feedback process, the tool is becoming ever more useful to developers of Second Life systems. This research project discusses the use of Case-based reasoning techniques and evaluates their application to the development of space within Second Life.
This thesis is dedicated to

Fawzi and Zuhria Shubati, My Parents.
Acknowledgements

“In the name of Allah, The Most Compassionate, The Most Merciful”

It would not have been possible to write this doctoral thesis without the help and support of the kind people around me, to only some of whom it is possible to give particular mention here.

First of all, I would like to express my deep and sincere gratitude to my supervisors; Prof. Ray Dawson and Dr. Christian Dawson, whose encouragement, guidance and support from the initial to the final level enabled me to develop an understanding of the subject. Without their immense help, this study would never have been materialized.

I wish to express my gratefulness and thanks to Professor Moade Fawzi Shubita, My brother, who through my childhood and study career had always encouraged me to be a better person, and without his financial and spiritual support it would not have been possible to finish this PhD.

I also would like to give a special thanks to my lovely fiancé, Heba, for her prayers, love, courage, support and understanding during the long period of my absence.

Lastly, and most importantly, I would like to thank my parents, Fawzi and Zuhria Shubita. They raised me, taught me, supported me, and loved me. To them I dedicate this thesis with all my love and respect.
# LIST OF CONTENTS

**ABSTRACT** ......................................................................................................................II

**ACKNOWLEDGEMENTS** ................................................................................................. IV

**CHAPTER 1: INTRODUCTION** ...................................................................................... 1

1.1 Introduction .................................................................................................................. 1

1.2 Problem Overview ...................................................................................................... 3

1.3 Research Aim and Objectives .................................................................................... 3

1.4 Research Motivation ................................................................................................... 4

1.5 Structure of the Thesis ............................................................................................... 4

**CHAPTER 2: BACKGROUND AND LITERATURE REVIEW** ................................. 7

2.1 Introduction .................................................................................................................. 7

2.2 Multi-User Virtual Environments .............................................................................. 8

2.3 Second Life .................................................................................................................. 9

2.3.1 The Strengths of Second Life ................................................................................. 11

2.3.2 Building inside Second Life ................................................................................... 13

2.3.2.1 Inventory ........................................................................................................... 14

2.3.3 Recent Surveys on Second Life ............................................................................. 16

2.4 Summary ..................................................................................................................... 17

2.5 Software Engineering Methods and Techniques ...................................................... 18

2.5.1 Software Development Methodology ...................................................................... 18

2.5.2 Software Process models ....................................................................................... 19

2.5.2.1 The Waterfall Model ......................................................................................... 19

2.5.2.2 The Incremental Model ..................................................................................... 20

2.5.2.3 The Spiral Model ............................................................................................... 22

2.5.2.4 The Prototyping Model ..................................................................................... 24

2.5.3 Summary ................................................................................................................ 26

2.4 Case-Based Reasoning ............................................................................................... 27

2.4.1 Introduction .............................................................................................................. 27

2.4.1.1 Advantages of Case-Based Reasoning ............................................................... 28

2.4.2 The CBR Cycle ....................................................................................................... 29

2.4.2.1. Retrieval: Similarity ......................................................................................... 30

2.4.2.2 Matching ............................................................................................................. 31

2.4.2.2. Reuse: Adaptation ............................................................................................. 32

2.4.2.3. Verification: Revise .......................................................................................... 33
### List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1</td>
<td>Example screen shot from Second Life</td>
<td>2</td>
</tr>
<tr>
<td>2-1</td>
<td>Screenshot of MUD</td>
<td>9</td>
</tr>
<tr>
<td>2-2</td>
<td>Avatar creations in Second Life</td>
<td>9</td>
</tr>
<tr>
<td>2-3</td>
<td>Inside Second Life</td>
<td>13</td>
</tr>
<tr>
<td>2-4</td>
<td>Second Life Inventory</td>
<td>15</td>
</tr>
<tr>
<td>2-5</td>
<td>The Waterfall Workflow (Gasson, 1995).</td>
<td>19</td>
</tr>
<tr>
<td>2-6</td>
<td>The Incremental Model Workflow (Gasson, 1995).</td>
<td>21</td>
</tr>
<tr>
<td>2-7</td>
<td>The Spiral Model diagram from (Boehm 1987)</td>
<td>23</td>
</tr>
<tr>
<td>2-8</td>
<td>Lifecycle of the XP process (beck, 2004)</td>
<td>24</td>
</tr>
<tr>
<td>2-9</td>
<td>the prototyping model Workflow (Lea, 1990)</td>
<td>25</td>
</tr>
<tr>
<td>2-10</td>
<td>CBR Cycle (Yip, 2006)</td>
<td>30</td>
</tr>
<tr>
<td>2-11</td>
<td>Retriever Prototype Architecture (Torres et al., 2004)</td>
<td>31</td>
</tr>
<tr>
<td>2-12</td>
<td>Schema for a software CBR system (Urwiler, 1998)</td>
<td>34</td>
</tr>
<tr>
<td>3.3-1</td>
<td>Building in Second Life</td>
<td>43</td>
</tr>
<tr>
<td>3-2</td>
<td>IBM in SL</td>
<td>45</td>
</tr>
<tr>
<td>4-1</td>
<td>The available categories within SL (snapshot of the first step of the system)</td>
<td>51</td>
</tr>
<tr>
<td>4-2</td>
<td>Case Similarity (snapshot of the similarity window)</td>
<td>53</td>
</tr>
<tr>
<td>4-3</td>
<td>The priorities are shown next to the descriptors to be chosen (snapshot of the third step of the system)</td>
<td>54</td>
</tr>
<tr>
<td>4-4</td>
<td>Step 1 of the system process</td>
<td>57</td>
</tr>
<tr>
<td>4-5</td>
<td>Step 2 of the system process</td>
<td>58</td>
</tr>
<tr>
<td>4-6</td>
<td>Step 3 of the system process</td>
<td>59</td>
</tr>
<tr>
<td>4-7</td>
<td>Step 4 of the system process</td>
<td>60</td>
</tr>
<tr>
<td>4-8</td>
<td>Solutions list</td>
<td>60</td>
</tr>
<tr>
<td>4-9</td>
<td>Adjusting feature</td>
<td>61</td>
</tr>
<tr>
<td>4-10</td>
<td>Objects retrieved. The result here depends on the solutions the user selects</td>
<td>61</td>
</tr>
<tr>
<td>4-11</td>
<td>The system will direct users to their desired objects inside SL</td>
<td>62</td>
</tr>
<tr>
<td>4-12</td>
<td>System Work chart diagram</td>
<td>63</td>
</tr>
<tr>
<td>4-13</td>
<td>Use Case Diagram. To demonstrate the system from the user’s point of view, this figure shows how the system evolves in a number of steps to help User ‘A’.</td>
<td>64</td>
</tr>
<tr>
<td>5-1</td>
<td>This source code shows how the priority value ‘0.2’ is used in the CBR tool. Also some parts of the CBR web system source code is given in Appendix D.</td>
<td>68</td>
</tr>
<tr>
<td>5-2</td>
<td>Distributed Advertising</td>
<td>71</td>
</tr>
<tr>
<td>5-3</td>
<td>Feedback service (snapshot of the system)</td>
<td>72</td>
</tr>
<tr>
<td>6-1</td>
<td>Frequencies of congruence and incongruence cases, grouped by system categories.</td>
<td>83</td>
</tr>
<tr>
<td>6-2</td>
<td>Distribution of System rating percentages given by the users. Rating percentages shown in x-axis.</td>
<td>86</td>
</tr>
<tr>
<td>6-3</td>
<td>Average of System rating percentage given by users per group</td>
<td>86</td>
</tr>
<tr>
<td>6-4</td>
<td>total number of users used the CBR system from August, 2009 to August 2010</td>
<td>90</td>
</tr>
</tbody>
</table>
LIST OF TABLES

Table 2-1: Summary of CBR applications in various fields .......................................................... 34
Table 2-2: Summary of the main Case-Based Reasoning Shells (Watson, 1997) .................... 35
Table 4-4-1: Additional Functionality.......................................................................................... 56
Table 6-1: The table explains the frequency and percentage of objectives selected by users.... 78
Table 6-2: The table shows the rate of each objective was selected by users. ......................... 78
Table 6-3: User feedback ........................................................................................................ 79
Table 6-4: Main results of the comparison between the groups .................................................. 80
Table 6-5: Statistical analysis of differences in efficiency between groups ............................ 80
Table 6-6: Main results of the comparison between the groups .................................................. 81
Table 6-7: Statistical analysis of differences in efficiency of retrieval between groups ......... 81
Table 6-8: Questionnaire results ............................................................................................... 83
Table 6-9: Self-rating Second Life and Internet Virtual Environments experience ................. 86
Table 6-10: Main results of the comparison between the groups (With/ without using features).... 87
Table 6-11: Statistical analysis of differences in efficiency between groups .......................... 87
Table 6-12: Main results of the comparison between the groups (With/ without using features).... 88
Table 6-13: Statistical analysis of differences in efficiency between groups ............................. 88
Table 6-14: Main results of the comparison between the groups (With/ without using features).... 89
Table 6-15: Statistical analysis of differences in efficiency between groups ............................. 89
**LIST OF ABBREVIATION**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>SL</td>
<td>Second life</td>
</tr>
<tr>
<td>AI</td>
<td>Artificial Intelligence</td>
</tr>
<tr>
<td>CBR</td>
<td>Case-Based Reasoning</td>
</tr>
<tr>
<td>VR</td>
<td>Virtual Reality</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>LSL</td>
<td>Linden Scripting Language</td>
</tr>
<tr>
<td>VoIP</td>
<td>Voice over IP</td>
</tr>
<tr>
<td>AVR</td>
<td>Advertiser Visit Ratio</td>
</tr>
<tr>
<td>GUI</td>
<td>Graphical User Interface</td>
</tr>
<tr>
<td>DB</td>
<td>Database</td>
</tr>
<tr>
<td>ASC</td>
<td>Asset Server Cluster</td>
</tr>
<tr>
<td>UML</td>
<td>Unified Modeling Language</td>
</tr>
<tr>
<td>KNN</td>
<td>k-nearest neighbor</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information System</td>
</tr>
<tr>
<td>SQI</td>
<td>Software Quality Improvement</td>
</tr>
<tr>
<td>MLT</td>
<td>Machine-Learning Techniques</td>
</tr>
<tr>
<td>ANN</td>
<td>Artificial neural network</td>
</tr>
<tr>
<td>WBIS</td>
<td>Web-Based Information Systems</td>
</tr>
</tbody>
</table>
Chapter 1. Introduction

CHAPTER 1: INTRODUCTION

1.1 Introduction

“To study the abnormal is the best way of understanding the normal.”

— William James (1842-1910)

The presence of the Internet and various networking methods has allowed individuals from all around the globe to meet synchronously, break down the space barrier, and interrelate together. One communication medium that has improved the interaction process between users is virtual reality (VR) software, which allows people to act together more effectively and sensibly. VR creates a world in which all the users are engrossed and represented by avatars that deal with one another in a realistic fashion.

The whole virtual reality phenomenon was started in 1950 when Artificial Intelligence (AI) was created (Kolodner, 1993). The concept of AI was steadily developed with the assistance of technology in order to allow machines and software to behave as if they were intelligent.

There is something beyond description about finding oneself in a virtual room full of people’s avatars, even though the people are actually placed around the world. It is attractive for those who have not experienced it to see how easy it is to forget that one is in a virtual world rather than a real one. “Participants are fully immersed in the meeting or class and surrounded by avatars, each of which represents a real person. Over 50 different virtual worlds currently exist, of which the most extraordinary is Second Life – SL” (Azzara, 2007).
Second Life (see Figure 1.1) is considered to be the vision behind the current work on fully immersive 3D virtual spaces full with opportunities for networking, education, experimenting, and making money (Polischuk, 2007). It was initiated in 2003 and begins as a virtual gaming world of multiplayer online games, but it rapidly developed into a massive environment of opportunities in both the virtual and real worlds. “Now Second Life has over 13 million users and holds tens of millions of square meters of virtual lands that can be purchased and used for both leisure and businesses” (Educause, 2008).

Second Life has fascinated significant interest from business and service industry sectors all through the world. It is already residence to Pontiac, IBM, and Cisco, amongst other major organisations (Azzara, 2007). Second Life has already applied several main features, including Voice Over IP (VoIP), which lets users talk to one another within its virtual world (Educause, 2008). In addition to that, Second Life has materialized as a test space for new ideas, where real-life prototypes can be found at low prices, and where direct feedback obtained from users considerably enhance the design process and lead to inventive ideas and surprising results (Salomon, 2007).

Users of Second Life consider it to be the most appealing virtual reality software available; people who use it for the first time always long to go back (Rymaszewski, 2007).
1.2 Problem Overview

From a research perspective, a distinct lack of software methodologies used in the development and implementation of objects in SL has been noted (see chapter 3). Only IBM has implemented any recognised software development process, and then only simple use cases (See Chapter 3). Normal users can utilise the built-in library within Second Life to obtain objects as they are, or they may use very basic coding language skills to update or edit the original object obtained in order to satisfy their needs. The other option is to purchase advanced objects and use them.

Most software methods and techniques are based on certain steps to complete the process; several of these steps are not required in SL. After researching most of the available software methods and techniques, this author found that Case-Based Reasoning (CBR) was the closest possible technique to be applied in Second Life (See Chapter 4). This match was determined because the processes involved are all primarily related to the Second Life methods, and no major unnecessary steps are involved to complete the process.

Thus, CBR has been chosen as the problem-solving technique for the gap that appeared. Therefore, a CBR web system has been designed with a unique equation to prove that this methodology is the best possible method to be used in Second Life to date.

1.3 Research Aim and Objectives

The aim of this research is to prove that Second Life can benefit from the application of a software methodology, and that Case-Based Reasoning (CBR) is an appropriate technique for such an application.

Several objectives must be tackled in order for the aim to be fully accomplished:

1. To examine the literature concerning Second Life and other virtual worlds to determine if any systematic methodologies were used in the development of the virtual environments.

2. To create an experimental Second Life “land” to determine the necessities required to build and develop lands within Second Life, and to gain enough personal experience to evaluate what types of software methods are required and which are better.
3. To interview Second Life developers to verify the findings from the literature about the use of systematic methodologies for Second Life development, and to discover whether any methodology is used in practice.

4. To examine different possible software development methods and techniques for use with Second Life to determine which method is better and, in particular, to determine if Case-Based Reasoning (CBR) is an appropriate tool for Second Life development.

5. To build a Case-Based Reasoning web-based system to determine if practical benefits can be obtained from such a system to assist in Second Life development.

6. To develop a systematic methodology for Second Life development based on the experiences of objectives 2 and 5.

7. To make use of the Second Life users’ continuous feedback to enhance the CBR tool and the Second Life development methodology.

8. To evaluate success of the developed CBR tool for Second Life development and the associated methodology by examining the results of using the system, analyzing feedback from users, and interviewing experts in software and Second Life development.

1.4 Research Motivation

The wide distribution of the Internet around the world has allowed virtual reality software to be easily accessible from any place at any time. This VR software allows the users to indulge in a world of illustrations, where all the surroundings are formulated to give them the sense that they are in a true world in every aspect. The combination of opportunity, games, and serious business intent creates many different motivations to enter Second Life, in particular. Not only that, but the members of Second Life are different and diverse according to their interests—whether they use it as a game or actually perform business activities in order to advertise for specific products or companies.

1.5 Structure of the Thesis

The Thesis contains eight chapters:

- Chapter 1 is the introduction, which gives an idea of what is being researched as a whole, as well as the aim and objectives of the research.

- Chapter 2 is the literature review. This chapter is divided into three main parts. The first part contains an in-depth study of Second Life. Second Life is defined and all its
components are highlighted. The second part discusses Case-Based Reasoning and defines its process cycle. The final part briefly describes other software methods and techniques and the web-based technology in general.

- Chapter 3 talks about all the experiments that have been conducted inside SL. to find out the necessities required to build and develop lands within Second Life. In addition, this chapter describes interviews conducted inside Second Life to verify the findings from the literature about the use of systematic methodologies for Second Life development. Also it discusses the process similarities between Second Life development and Case-Based Reasoning. From these similarities, the reasons for applying CBR in SL emerge.

  *The results of this chapter are presented in a published paper (Shubati, A., Dawson, R.J. and Dawson C.W., 2009).*

- Chapter 4 describes the web-based system that was created in detail. The system uses the CBR method, but with a few improvements. The section fully describes every phase of the system.

  *The results of this chapter are presented in two published papers (Shubati, A., Dawson, R.J. and Dawson C.W., 2009), (Shubati, A., Dawson, R.J. and Dawson C.W., 2010).*

- Chapter 5 describes continuous feedback approaches available in the tool and how it works.

  *The results of this chapter are presented in a published paper (Shubati, A., Dawson, R.J. and Dawson C.W., 2010).*

- Chapter 6 presents the results and discussion. It describes the evaluation of the work and discusses all the results.

- Chapter 7 covers conclusions and future work. It discusses the conclusions reached from the thesis as a whole.
1.7 List of Publications

Some of the contributions presented in this thesis have already been published in two peer reviewed conference proceedings and submitted to a journal as follows:

Published Papers


Paper submitted for publication

Chapter 2: BACKGROUND AND LITERATURE REVIEW

2.1 Introduction

Regarding objective (1) of the Ph.D. research, this chapter examines the literature concerning Second Life and other virtual worlds to determine if any systematic methodologies were used in the development of the virtual environments.

The first part of this background and literature review chapter concerns research performed on the Second Life virtual world. This section starts with defining virtual worlds in general and then fully describes all the aspects of SL to identify its characteristics and effectiveness. Second life is anything the users desire it to be. It is their personal virtual life, after all, and whatever users do in this virtual world is up to them (Rymaszewski, 2007). The chapter identifies the various things that members can do within SL along with the reasons for using it. Next, the chapter provides an explanation of how SL works and describes how to use it. In addition, the chapter presents an in-depth description of the main parts that involve building in SL and the way in which the inventory is managed.

The second part gives a review of software methodologies and its applicability to Second Life. The third part concerns Case-Based Reasoning (CBR) as a software technique. Again, CBR is explained thoroughly, including its definitions, the cycle involved in the CBR process and CBR tools. This section also gives a brief overview of the applications of Case-Based Reasoning, the web-based CBR systems and the processes by which they work. CBR is identified through its process cycle to be the most appropriate technique to be used in accordance with SL. The final part briefly describes the web-based technology in general.
2.2 Multi-User Virtual Environments

The virtual world (VW) is expressed as a “synthetic world: an expansive, world-like environment made by humans, for humans, and which is maintained, recorded and rendered by a computer” (Castronova, 2005).

VWs are artificial environments that imitate the real world and allow many people to form large communities and interact with each other at the same time (Bartle, 2003). According to researchers, 20 million people expend an average of 22 hours per week in different VWs (Balkin, 2006).

The term “multi-user virtual environments”, referred to as virtual worlds, is currently used to describe a 3D graphic environment, and accessed over the Internet, which allows a large number of users to interact synchronously.

The initial VWs were created in the 1970s with Maze War, MUD and MUSH being the most popular ones (Koster, 2005). Where the Maze War was the first 3D multiplayer game to launch the idea of avatars, the MUD (Multi-User Dungeon), shown in Figure 2.1, and MUSH (Multi-User Shared Habitat) were text-only, role-playing games with an online chat (Koster, 2005).
VWs created now are quite different from those developed in the past. They consist of multiplayer gaming environments, make use of 3D virtual reality and also allow people to interact socially using their avatars (see Figure 2.2). These popular worlds include Second Life, Virtual World of Kaneva, Active Worlds, and many others (Asanowicz, 2009).

Since 1995, use of e-mail on college courses has increased from 20.1% of courses to 59.3% in 2000 (Jennings, 2007). Furthermore, 42.7% of college courses employed Web resources as part of the programme in 2000, compared to 10.9% of courses in 1995 (Jennings, 2007). According to the New Media Consortium report, virtual worlds such as Second Life, Active Worlds, are expected to follow these trends and to become more widely used within two to three years (New Media Consortium, 2006).

Second Life is by far the most well-known and sophisticated of these virtual environments, although there are others such as Open Simulator (OpenSim, 2008), There (There, 2008) and Project Wonderland (Sun, 2008). However, Second Life is different from many of the “worlds” that have come before it. “Second Life is what one makes of it” (ELI, 2007).

2.3 Second Life
Launched in 2003, Second Life is an environment entered via one’s computer and broadband Internet connection. The number of users in Second Life has grown rapidly with the majority of them located in the U.S., Canada and the U.K. In addition, many companies have distinguished the business opportunities available and have already set up residence in Second Life (Hobson, 2007).

Second Life is a Web-based virtual world developed by California-based Linden Research, Inc. According to a Sege article (Sege, 2006) the mainstream news first noticed it in late 2006. Sege’s article was subtitled, “In a user-created universe, alter egos bridge the gap between fantasy and reality” (Descy, 2008).

Second Life is a new communications medium in which people meet inside a computer simulation of a 3D physical space (Azzara, 2007). It is the largest virtual world, with more than tens of millions of square meters of virtual lands. It has more than 13 million registered residents and a successful economy (Educause, 2008). With almost 13 million residents, it ranks in the world’s top 100 countries. With more than US$1 million a day in transactions, it has a viable economy (Bray, 2007).

Second Life may seem like just another virtual game, but in this world, people create avatars who do what they would do in the real world, and furthermore (Polischuk, 2007) users are the ones who determine what second life means to them (Rymaszewski, 2007).

Residents enter Second Life via their “avatar”, which can be customised from a simple, lifelike representation to a complete fancy creation with all aspect of the avatar’s look easily changed. The experience of users who have used Second Life suggests that many residents will have a cupboard of avatars from which they will choose the most suitable for the activity in which they are presently engaged (Salt, 2008).

The Second Life environment is basically composed of many islands. Travel between islands and locations are achieved by the use of a “teleporting” feature. In order to teleport, the users need to know the name or the coordinates of the intended destination. Destinations are linked by a SLURL (Second Life Uniform Resource Locator). As full compatibility exists between SL and the World Wide Web, SL locations can be accessed directly from websites, and websites from SL (Biggs, 2009).
Second Life has its own currency: the linden dollar. Linden dollars are transferable for real-life dollars (Rymaszewski, 2007). Linden Labs created its own currency, the Linden dollar (L$), which is tied to the U.S. dollar at an exchange rate of L$268 to $1 (Azzara, 2007).

“Most things in Second Life, including building objects and buying land, cost money” (Net Developers, 2003). Depending on the membership plan users choose, they may also receive Linden dollars when they begin their SL membership (Rymaszewski, 2007). All users can buy Linden dollars to contribute in the Second Life economy (Educause, 2008).

A further powerful characteristic of Second Life is the capability to attach a script to an object. Scripts can change simple objects into interactive experiences that express information, play video and sounds, or add special move.

“The scripting language has been designed so that even non-programmers can make simple modifications and customizations. For example, a door may have a script so that it opens with a password. It will be easy to modify the door script to the password of one’s choice” (Net Developers, 2003). The Linden Scripting Language (LSL) is an easy, powerful language used to attach behaviours to the objects found in Second Life. It follows the familiar syntax of a c/Java style language (Brashears, 2003).

The head of the management consultancy Gronstedt Group SL has acknowledged the following:

- Gartner Group has estimated that 80 percent of active Internet users will become involved in non-gaming virtual worlds like Second Life by the end of 2011.
- IBM is investing millions of dollars in a number of Second Life islands, and that other major companies are also investing in Second Life, e.g., Sun, Dell, Intel, Adidas, Toyota, GM.
- Hundreds of universities, including Harvard and INSEAD, teach classes in Second Life for credit (Gronstedt, 2007).

2.3.1 The Strengths of Second Life

Why do we need SL? That was the same question asked about the internet in 1994. Second Life is a whole new society that exists only in cyberspace. What this shared 3-D space
offers is wide open: Anything is possible. It will grow and evolve and become what the inhabitants make of it.

Second Life has shown that:

✓ Residents will want to explore and keep up on what’s new.
✓ Residents will want to use this new world as a place to meet new people, socialize and network.
✓ Residents will want to build and create buildings, textures and accessories for others to see and use.
✓ Residents will want to start a business and make money to expand their holdings.
✓ Many Residents will find new and different things to do in this amazing world. (Net Developers, 2003).

A rising number of companies that have entered Second Life are globally recognized names that have identified its business appeal. They have done this for different reasons, but all have one inspiration in common: “the desire to create and develop a personal connection with customers in a place where there are no real-world manufacturing or service costs and few barriers to what is possible” (Hobson, 2007).

The increasing capacity of virtual goods and services provided in Second Life has helped steer media coverage of the platform. During the year 2006, a number of real-world businesses such as Dell, American Apparel (Gross, 2006), and IBM (Reuters, 2006) opened their doors in the virtual world with much display (Jennings, 2007).

Second Life is an environment filled with opportunities for networking, teaching, experimenting, and even making money. Second Life users can be presented at meeting from anywhere on the globe without leaving their desk. As Second Life grows, its meeting-hosting ability will improve (Azzara, 2007).

In 2006 an explosive growth in the use of Second Life by educators and institutions has been noticed. Many of these projects influence the immersive qualities of Second Life to offer experiential learning opportunities (Johnson, 2007). In addition to that, a completely new way to interact with information and communicate with people via the Internet was introduced in Second Life (Hobson, 2007).
It has been argued that the opportunities SL provide to socialise via alternative characters is “much more important in web-based instruction than in distance-education courses for learners, who feel or perceive that they are a socially integrated part of a virtual community and that they have a sense of contact in the network” (Jung, 2001).

Furthermore, Salt (2008) identifies that it is important to distinguish the group that ranges from those who see Second Life as more about identity through avatars and networking, to those who want to use the avatar only as a tool to acquire knowledge, such as language learning, with the appearance of avatars being less important.

Like any new information technology product or service, obstacles always exist to broad-scale implementation. In the case of Second Life, these obstacles are technical (Kirkpatrick, 2007). The editor of Fortune magazine David Kirkpatrick remarked, “Second Life’s software is so hard to use that fewer than one in six who try it are still online 30 days later. Linden’s servers frequently falter under the weight of its growing audience, and critical functions, such as search, sometimes break down” (Kirkpatrick, 2007).

2.3.2. Building inside Second Life

From the resident’s point of view, SL works as if they were gods in real life (Rymaszewski, 2007). Everything in the space is user produced, from the clothing the avatars wear to the landscapes, buildings and objects.

Users are a part of the creation of a new world. The manual reads as follows:
“We value your strengths and personality and expect them to help us grow and develop Second Life. Stretch a little, challenge yourself and learn new things from the others. Learn by copying: Look at other people’s work, copy textures, analyze others’ scripts, etc.

Objects can be public or owned by a particular person. When you build something, by default it is your personal property until and unless you turn it into public property. Personal property has both rights, responsibilities and costs. As owner, you can set permissions that control if others can move; copy or delete your property. Public property can be moved, edited, copied and deleted by anyone.

An object is something created in Second Life. Objects are made out of primitives and can be just about any shape, material or appearance. Objects can have physics and/or scripts assigned to them for added functionality” (Net Developers, 2003).

SL object permissions refer to the privileges that an object’s designer gives to future owners of the object. These privileges include: modify, copy, and transfer. These permissions manage whether or not, for example, a user can change the characteristics of objects that he bought, make a copy of them, and send them to a friend (Jennings, 2007).

The creation of Second Life objects begin with the essential shapes which include “spheres, cylinders, cubes, and so on” that can be customized along the X,Y, and Z axes to adjust the shape. They can be distorted, rotated, stretched, and overlapped and users can also select the object’s size, position, and rotation along these axes. For best using, “it is easier to use the existing objects and edit them to match one’s requirements” (NMC, 2008).

2.3.2.1 Inventory

The Second Life inventory is a storage system with folders, subfolders, and items stored inside it. Inventories could grow as large as users want. Some users have over 20,000 items stored there (Masfield, 2007). “An inventory is the collection of clothing, objects, textures, etc. that an avatar possesses. Users’ inventories travel with them, and any part may be used at any time” (Second Life, 2008).

Second Life inventories have three closely tied systems:
• The Resident Inventory lives in a database (DB). Second Life currently has many of these user databases. The database entries are links to actual objects.

• The actual objects live in the Asset Server Cluster (ASC). Any object in the user inventory references an asset stored in the Asset Server Cluster.

• Second Life does not store individual objects that are presently in-world to the asset server or any user inventory database (see Figure 2.4).

Figure 2-4: Second Life Inventory

Thus, the user inventory lives in the DB, and each object references one or more assets in the ASC (Second Life, 2008).

Objects that have been created by other SL residents may be available for users to copy or modify as free objects, or they may be limited. However, some objects may be for sale but not allow modification or transfer of ownership after their purchase (NMC, 2008). The Second Life Inventory allows users to save all their creations of items directly to their personal computers. These items include skins, textures, scripts and complex objects.

Furthermore, during their time in Second Life, users will collect many belongings; this includes objects, textures, sounds, items of clothing, scripts and more. By collecting and storing things in an inventory, they will always be accessible when users want them, also they will be
safe in case the original is deleted as the users can store, view and access their Inventory at any time (Net Developers, 2003).

The Second life Inventory could be seen as “one’s own unique collection of Second Life items that range from complete houses and spaceships to socks and bubble gum” (Rymaszewski, 2007). At the start, when Second Life was in its beginning, a cap used to exist on the number of items one could have in an Inventory: 255. Now that the limit is gone, most SL users quickly accumulate many thousands of objects (Second Life, 2008).

2.3.3 Recent Surveys on Second Life

New Media Consortium’s Survey, 2007

This survey, which was based on 209 respondents, shows some of the strengths and issues regarding the education in Second Life. The most positive experiences were “rich interactions, meeting new people, expanding networks, generosity of community.” The worst reported experiences in Second Life concerned technical issues. On the other hand, 58 percent of users stated that they had extended their professional network and increased cooperation (NMC, 2007).

Vogel, Guo, and Zhang Survey, 2008

This survey was based on Hong Kong and Dutch graduate students and compared Second Life to other group support systems. 55 percent of the returned surveys ranked Second Life the lowest in terms of convenience, ease of use, team attitude, and perceived team attitude when compared with email, forums, video conferencing, and MSN. One reason for these findings is the difficulty of loading and using the software. (Salt, 2008).

Eduserv Survey, 2008

This survey examined the use of virtual worlds in the U.K.’s higher education institutions. A major change from earlier virtual worlds was that “the Second Life contributors increasingly worked in teams rather than in isolation, evidence of both the growing number of academics involved and institutional support to enable the establishment of working groups” (Eduserv, 2008).
From studying these surveys and the outcomes of it, some of the strengths and weaknesses of second life have been revealed. The three surveys exposed the importance of Second life as an on-line virtual environment. Moreover, they have shown that Second Life still has some issues to resolve concerning the technical matters and software usage. It also gives some ideas on how to apply and develop the upcoming studies and surveys in this research project.

2.4 Summary

From reviewing the literature of Second Life the main characteristics of SL development were identified. In Second Life the main idea of the whole virtual world was built around the creation of its own users, and the users themselves have the capacity to control their entire surrounding environment. In addition to that, the entire knowledge base of Second life environment is created and constantly updated by its own users.

Furthermore, building inside Second Life depends mainly on objects available within it to the extent of the many lands available at the moment that provide objects to use. The vast availability of the objects in store in Second Life allows users, in theory, to find the most appropriate objects they wish to build. Therefore, if they know where to look, users can find the exact match to their requirements without having to build the object from scratch.

As Second Life users come from different backgrounds and ages; most of the users within the virtual world are not familiar with programming languages. In order to build in SL, it is easier for the users to use existing objects. However, Second Life largely depends on the users within it and the feedback they produce. From this feedback, the users usually require changes; therefore, a method must be in place to adapt according to their demands.

Even though a number of individuals and companies have developed a presence in Second Life, no appropriate methodology has been found for undertaking such developments. Therefore, more research and investigation is required inside Second Life to see what methods, if any, are used by developers (see Chapter 3). In addition, a review of the major software methodologies is needed to find their applicability to Second Life development along with Case-Based Reasoning, as the suggested problem-solving technique for the gap that appeared, which will be covered in the next section.
2.5 Software Engineering Methods and Techniques

2.5.1 Software Development Methodology

One of the most well known concepts in the area of Information Systems Development is “methodology”. “The notion of “methodology” was very vigorous during the 70s and until the end of the 80s” (Papatsoutsos, 2000). Huijbers defined the methodology as a “coded set of recommended practices, sometimes accompanied by training materials, formal educational programs, worksheets and diagramming tools” (Huijbers, 2004).

Methodology is not just a method, or a process-model. “A methodology is a holistic approach: it embodies an analytical framework which is conveyed through inter subjective representational practices and operationalised through a ‘toolbox’ of analytical methods, tools and techniques” (Gasson, 1995).

A methodology can be viewed as consisting of three major components (Papatsoutsos, 2000):.

a) A work breakdown structure that provides guidelines of what to do and when to do it
b) Techniques on how to do what needs to be done
c) Recommendation on how to manage the quality of the results

A software methodology should tell you what steps to take and the mechanism of those steps along with the reasons why those steps should be taken, in that exact order. (Jayaratna, 1994).

At the more practical level a methodology consists of a number of guidelines regarding techniques and tools. A technique indicates how an activity should be undertaken; a tool is linked to a technique and is used to ensure that an activity is undertaken in the most effective way (Madsen, 2000).
2.5.2 Software Process models

The main function of software development process models is to establish the order of the stages involved in software development and to determine the criteria for progressing from one stage to the next (Salo, 2007).

A software process model is a description of the series of activities carried out in a project, plus the relative order of these activities (Jayaratna, 1994). “Explicit models of software development date back to the earliest projects developing large software systems in the 1950s and 1960s” (Scacchi, 2001).

There are various life cycle models. Most of them are variations of three standard software development models: the waterfall, incremental, and spiral models. These three along with the prototyping model are briefly described here to investigate their applicability to Second Life development.

2.5.2.1 The Waterfall Model

The waterfall model usually represents a prescriptive for classic software life cycle, where software development proceeds through an orderly series of transitions from one phase to the next in order (Royce 1970). During each phase, additional information is gathered or developed and used to create the stage outcomes. (See figure 2.8)

![Figure 2-5 The Waterfall Workflow (Gasson, 1995).](image-url)
The waterfall model has three underlying assumptions:

- The problem domain is well known by both the client and the development team;
- The problem domain is relatively stable over the development period;
- The client can wait for the entire solution to be delivered.

An important concern for the Waterfall model is that modifications are often delayed until the maintenance phase. With the cost to correct a problem getting higher with each successive phase, the use of waterfall model could be very costly (Condensed GSAM Handbook, 2003).

**Advantages**

- Easy to understand and implement.
- Widely used and known
- Fits other engineering process models: civil, mechanical, etc.
- Works well on large products and weak teams.

**Disadvantages**

- Doesn’t reflect the iterative nature of exploratory development.
- Sometimes unrealistic to expect accurate requirements early in a project
- Software is delivered late, which delays discovery of serious errors.
- No inherent risk management
- Difficult and expensive to change decisions.
- Significant administrative overhead, costly for small teams and projects.

**2.5.2.2 The Incremental Model**

The incremental model involves a complete set of requirements that are implemented in a sequence of small tasks. Sorensen (1999) stated that “A project that uses the incremental model may start with general objectives. Then some portion of these objectives is defined as requirements and implemented, followed by the next portion of the objectives until all objectives are implemented. However, the incremental model should support the development approach and must not be taken as alternative for traditional development methodologies (Urlocker, 1989).
This Incremental model merges the classic software life cycle with iterative improvement at the stage of system development (see figure 2.9). “It also supports a strategy to periodically distribute software maintenance updates and services to dispersed user communities” (Scacchi, 2001). Furthermore, the incremental model reduces the time between the final specification and delivery of each application function, and also reduces the impact of change requests by breaking a project down into pieces.(Tate and Verner, 1990).

The Incremental approach has been extended through the use of software tools and techniques which directly provide support for incremental development for early and constant user feedback and assessment (Graham1989).

Figure 2-6 The Incremental Model Workflow (Gasson, 1995).

**Advantages** (Condensed GSAM Handbook, 2003)

- Provides some feedback, allowing later development cycles to learn from previous cycles.
- Requirements are relatively stable and may be better understood with each increment.
- Allows some requirements modification and may allow the addition of new requirements.
Chapter 2. Background and Literature Review

- A usable product is available with the first release, and each cycle results in better functionality.
- The project can be stopped any time after the first cycle and leave a working product.
- This method can usually be performed with fewer people than the waterfall model.
- Testing may be easier on smaller portions of the system.

Disadvantages (Condensed GSAM Handbook, 2003)

- The majority of requirements must be known in the beginning.
- Formal reviews may be more difficult to implement on incremental releases than on a complete system.
- Interfaces between modules must be well-defined in the beginning.
- Cost and schedule overruns may result in an unfinished system.
- Operations are impacted as each new release is deployed.
- Users are required to learn how to use a new system with each deployment.

2.5.2.3 Spiral Model

The Spiral Model integrates fundamentals of specification-driven, prototype-driven process methods, with the traditional software life cycle (Scacchi, 2001). It also symbolizes a risk driven approach to software process structuring (Boehm, 1987). DeGrace (1990) noted, “I believe the spiral model actually is applicable to many business applications, especially those for which success is not guaranteed or the applications require much computation, such as in decision support systems.”.

Spiral model describes development as an iterative four-phase process, for combining the various approaches: (see figure 2.10)

- Expression of needs;
- Feasibility;
- Prototyping;
- Development of the final product.

Through each cycle of the Spiral Model, problems are identified and addressed and solutions for these problems are given (Condensed GSAM Handbook, 2003). “Each cycle ends in a review in which stakeholders agree on plans for the next cycle. While a prototype may be
produced for IOC, software is usually not developed for release until the last cycle” (Jayaratna, 1994).

The steps in the spiral model can be generalized as follows:

- The new system requirements are defined in as much detail as possible.
- A preliminary design is created for the new system.
- A first prototype of the new system is constructed from the preliminary design.
- The existing prototype is evaluated in the same manner as was the previous prototype.
- The preceding steps are iterated until the customer is satisfied that the refined prototype represents the final product desired.
- The final system is constructed, based on the refined prototype.

Advantages
Chapter 2. Background and Literature Review

- The model accurately reflects the iterative nature of software development on projects with unclear requirements
- Incorporates the advantages of the waterfall and evolutionary methods
- Comprehensive model decreases risk
- Good project visibility.

Disadvantages

- Needs technical expertise in risk analysis and risk management to work well.
- Model is poorly understood by non-technical management, hence not so widely used
- Complicated model needs competent professional management
- High administrative overhead.

2.5.2.4 Prototyping Model

The prototyping model or the RAD approach “Rapid application development” has significant advances in software development environments by allowing rapid production and other user interface features (see figure 2.11). This model seeks to reveal the functional activities of a proposed system by the implementation of the prototype specification (Huijbers, 2004).
Schach (1990) noted “An important aspect of this model is to develop the prototype as quickly as possible with the purpose being to facilitate an agreement between the developer and the client as to what the product is to do”. Furthermore, users' feedback which come from their experience with the practical prototype can be used to adjust the system requirements before continuing with the other development phases (Lea and Chung, 1990).

Advantages

- Reduces risk of incorrect user requirements.
- Good where requirements are changing.
- Standard visible progress aids management
Chapter 2. Background and Literature Review

- Supports early product marketing

Disadvantages
- An unstable implemented prototype regularly becomes the final product.
- Requires extensive customer association
- Difficult to know how long project will last
- Easy to drop back into code-and-fix without suitable requirements analysis, design, customer evaluation and feedback.

2.5.3 Summary

Most of the software methods reviewed are based on certain steps to complete the process; several of these steps are not required in SL. Building in Second Life is an efficient process that is straightforward and not complicated, and the intermediate steps of these methods didn't really seem to create any intrinsic efficiencies.

In the waterfall model there is little opportunity for the user to preview the result until very late in the life cycle and the user is involved only in the beginning, while gathering the requirements. Also, a complete product is not obtainable until the end of the process which makes the delivering of the user feedback to the developers extremely difficult. In Second Life, on the other hand, the idea of the whole virtual world was built around the creation of its own users and it largely depends on the users within it and the feedback they produce; therefore, a method must be in place to adapt according to their demands. Furthermore, the waterfall model can not handle dynamic changes in requirements over the life cycle and it is very costly to use if requirements are dynamically changing throughout the process of the life cycle.

The spiral model is only suitable for long-term development and is applicable to only large-scale system development. Also, this model is complex and requires a lot of planning and developers and users of Second Life may find it too complicated to employ. In addition, the entire development of Second life environment is created and constantly updated by its own users; on the other hand, the spiral model is appropriate where there is limited user participation which makes it unsuitable for such development.

The other two models, the incremental and the prototyping models, are more appropriate for SL development as both of them can be modified during the development
process and they both accept the changing in requirements during their life cycles. However, from reviewing the literature of Second life, building inside Second Life mainly requires the users to see what others have previously built, and then decide what they want to use or edit from them without building from scratch. Therefore applying some of the phases which these methods possess for development would be a waste of time and money.

From the above remarks, the vital difference between SL development and other software development is the use of previous objects. In order to build in SL; it is easier for the users to use existing objects without having to build the object from scratch but no methodology has been published to enable the user to do so. In addition, Second Life largely depends on the users within it and their feedback. From this feedback, the users usually require changes; therefore, a methodology must be in place to adapt according to their demands.

2.4 Case-Based Reasoning

2.4.1 Introduction

Case-Based Reasoning involves adapting old solutions to meet new demands, using old cases to explain new situations (Kolodner, 1993). Case-Based Reasoning (CBR) is an Artificial intelligence (AI) technique that is particularly helpful when a problem domain lacks a strong set of heuristics but possesses a set of successfully and unsuccessfully solved cases. Hobson (2007) defines Case-Based Reasoning (CBR) as a “computerized method that attempts to study solutions that were used to solve problems in the past”.

In Case-Based Reasoning (CBR) systems, knowledge is found in a library of past cases rather than being programmed in usual set of rules. With each case contains an explanation of the problem plus a solution and the result; the knowledge used to solve the problem are not recorded but are implied in the solution (Stroulia, 1992).

The knowledge base contains the understanding that the expert has learned using experience and a reasoner which solves new problems by adjusting solutions that were used to solve old problems (Riesbeck & Schank, 1989). Case-Based Reasoning (CBR) takes the idea of personal knowledge one step further with the primary knowledge sources in CBR being not
Chapter 2. Background and Literature Review

generalized rules, but a collection of stored cases recording specific previous solutions (Kolodner, 1996).

Humans solve a problem by naturally searching their memory for past experiences that can be used in a new situation and they communicate their experiences by telling a story. The main reason for this is to produce new solutions by using knowledge from prior stories (Kolodner, 1993). Furthermore, Stroufia (1992) states that “Learning occurs when new cases are solved and stored in memory, along with the outcome of the solution. Learning also occurs when failed solutions are attributed to specific case features, and those features are then added as indices”.

Well known organizations like IBM, VISA International, Volkswagen, British Airways, and NASA have already made use of CBR in applications for customer support, quality assurance, aircraft maintenance, process planning, and decision support (Watson, 1997).

Case-Based Reasoning is different from other Artificial Intelligence techniques for the following reasons:

- The majority of AI approaches depend on general knowledge of a problem domain; however Case-Based Reasoning systems solve new problems by using precise knowledge of past experiences.
- After Case-Based Reasoning solves a problem, it will make the solution available for future problems (Doyle et al., 1998).

2.4.1.1 Advantages of Case-Based Reasoning

Environments which included CBR technology would be greatly improved for the following reasons: better using of past analysis, less redundancy, and better explanation for results and conclusions reached (Grupe, Urwiler, Ramarapu, & Owrang, 1998). Generally, “the second time people solve a problem or do a task is easier than the first because they remember and repeat the previous solution” (Kolodner, 1993).

Advantages of Case-Based Reasoning include the following:
• It proposes solutions to problems faster and avoids the time necessary to derive these answers from scratch.
• It proposes solutions in domains that are not completely understood. Therefore, solutions that the cases suggest also improve the quality of the solutions.
• It allows the prevention of previous mistakes.

Case-Based Reasoning provides a better match to actual human reasoning than other systems. It allows quicker knowledge achievement and provides unique explanation ability (Li, 1995).

Furthermore, Kolodner (1993) classifies five things the quality of Case-Based Reasoning depends on:
• its previous experience;
• its ability to understand new situations in terms of the old experiences;
• its proficiency at adaptation;
• its adeptness at evaluation and repair;
• its ability to integrate new experiences into its memory.

2.4.2 The CBR Cycle

Case-Based Reasoning revises the solution based on reusing a previous case; “it retains the new experience by incorporating it into the existing knowledge-base” (Aamodt & Plaza, 1994).

A general Case-Based Reasoning cycle may be described by the following four processes (see figure 2.5):

1. RETRIEVE the most similar case or cases.
2. REUSE the knowledge in that case to solve the problem.
3. REVISE the proposed solution.
4. RETAIN the parts of this experience which is useful for future problem solving (Aamodt & Plaza, 1994).
2.4.2.1. Retrieval: Similarity

Reasoning and learning from cases are based on the idea of similarity (Aha & Watson, 2001). Retrieval is the process of recovering a case or set of cases from memory, and it consists of two sub-steps: recall previous cases and select the best case (Kolodner, 1993).

Retrieving the most similar cases is the first and most essential step among the processes in a CBR cycle, because without it, the following steps cannot take place. Furthermore, in order to solve the new problem, Case-Based Reasoning system depends on its ability to retrieve the most similar and relevant cases (Bissoondoyal-Bheenick et al, 2006).

“The Retrieve task starts with a (partial) problem description and ends when a best matching previous case has been found. Its subtasks are referred to as Identify Features, Initially Match, Search, and Select, executed in that order” (Aamodt & Plaza, 1994).

The retrieval process in Case-Based Reasoning (CBR) includes experience of past solutions stored into a memory recognized as cases. The main aim of this process is to recover the most useful previous cases to the solution of the new problem and pay no attention to the unrelated previous cases (Torres et al., 2004).

In the retrieval process, a user enters a new case into the system. The system then recalls cases that have reasonably high similarity values. Several approaches to case retrieval may be taken, such as concept refinement methods and partial matching methods (see Figure 2.6).
addition, the techniques, which the case retrieval uses, include the fuzzy mathematical method, nearest neighbour search, and statistical weighting methods (Li, 1995).

![Figure 2-11: Retriever Prototype Architecture (Torres et al., 2004)](image)

### 2.4.2.2 Matching

A matching function is used to measure the overall similarity of the schema of a new case with a previous case also it assesses the level of similarity of a candidate previous case with a new one (Gupta & Montazemi, 1997).

Generally the similarity can be determined by the following functions: “NN is a non-parametric method that assesses similarity between a target case and a stored case based on their attribute resemblance. Cases are ranked by their similarity to the new case. Those with higher scores are more similar to the new case and will be retrieved before the lower score cases. A total of k most similar cases to the new case, which is called the k-NN, is to be found and retrieved” (Kolodner, 1992). NN, in this case, refers to “Nearest Neighbour”

Kernel methods can be used in Case-Based Reasoning systems when cases can be characterized in the form of mathematical feature vectors (Amodt & Plaza, 1994). The qualities of the Kernel methods are used to identify ideal cases which are similar to a given one (Bergmann, Breen, Goker, & Wess, 1999).
According to Stroulia (1992), measuring similarity has generated a range of different ideas which include:

- Nearest neighbour algorithms are the most popular and are based upon simple distance measures for each feature.
- Frequency preference: Preference is given to those cases that have been most frequently retrieved.
- Object-oriented similarity: For complex problem domains.
- Fuzzy similarity: This method uses concepts such as at-least-as-similar. (Stroulia, 1992)

### 2.4.2.2. Reuse: Adaptation

In Case-Based Reasoning problem solving, old solutions are used in solving new problems, and old solutions should be adapted to fit new situations (Kolodner, 1993). In general, adaptation is needed. Although, when an equal match exists between the previous and current cases no adaptation is required (Li, 1995).

Adaptation process works by identifying the variation between the retrieved and current cases, and identifying the part of a retrieved case which can be relocated to the new case (Mendes et al., 2002). In general, the solution of the retrieved case is reassigned to the new case as its solution case. However, several methods for case retrieval could be used as case adaptation generally needs problem-specific knowledge (Aha et al., 2001).

Certain approaches have been proposed for the adaptation problem. While Smith and Faltings proposed a case-based reasoner in which constraint limit mathematical relationships among dimensions, Purvis and Pu proposed another approach for adaptation based on constraints (Aha et al., 2001).

The reuse of the retrieved case solution for the new case focuses on “two features: (a) the differences among the past and current cases, and (b) what part of a retrieved case can be transferred to the new case” (Plaza, 1994). Furthermore, Aamodt has identifies two ways to adapt past cases: (1) reuse the past case solution (transformational reuse), and (2) reuse the past method that constructed the solution (derivational reuse) (Aamodt & Plaza, 1994).
2.4.2.3. Verification: Revise

The revise process is used when the case solution produced by the reuse process proves to be incorrect. This process gives an opportunity to learn from failure. “When all knowledge necessary for evaluation is known, one can think of this step as a validation step” (Kolodner, 1993).

This process is consists of two tasks: (1) Evaluate the case solution produced by reuse. If successful, learn from the success. (2) If not repair the case solution using domain-specific knowledge (Aamodt & Plaza, 1994). After linking the previous solution to the new case the test of the new solution in the real world may be necessary.

2.4.2.4. Storage: Retain

Retaining the case is the process of adding what is useful from the new case into the case database. This phase involves the following: a) deciding what information to retain, b) choosing how to store the case for future retrieval, and c) adding the new case into the case database (Stroulia, 1992).

Retaining is the process of adding what is useful to retain from the new problem-solving experience into the existing knowledge. The main outcome of this process is the learning from the success or failure of the proposed solution (Aamodt & Plaza, 1994).

“The most important step at this time of memory update is choosing the ways to “index” the new case in memory” (Kolodner, 1993). Users must decide the suitable indexes for the new case and make sure that all other items stay available as they add to the case database storage.

2.4.3. Applications of Case-Based Reasoning

A Case-Based Reasoning application should support the four main phases of CBR: retrieval, reuse, revision and retention (see figure 2.7). Having many Case-Based Reasoning development applications available. Each one of them should have a different functionality and suit different requirements. “A good application should support a diversity of retrieval mechanisms and allow them to be mixed, when necessary” (Bareiss, 1989).

The first application of Case-Based Reasoning in commercial tools was in the early
1990s and since then it has been used to create numerous applications in a wide range of domains such as problem diagnosis, legal precedence, and strategic planning. Other application areas include tactical planning, political analysis, situation assessment, fraud detection, and message classification (Hobson, 2007).

![Figure 2-12: Schema for a software CBR system (Urwiler, 1998)](image)

After a number of years of CBR research, lots of applications have been reported in areas such as manufacturing (Duverlie & Castelain, 1999; Wu et al., 2006), software and knowledge engineering (Mendes et al., 2002), education (Han et al., 2005), customer relationship management (Ahn et al., 2007), and management systems (Roddis & Bocox, 1997; Yu & Liu, 2006). Table 2.1 lists recent CBR applications in various fields.

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Objective</th>
<th>CBR output</th>
<th>No. of cases</th>
<th>Attributes weighting method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer relationship management</td>
<td>Classification of customers’ buying behaviour for a specific product using their demographic characteristics</td>
<td>Purchasing (1) or non-purchasing customer (0)</td>
<td>980</td>
<td>Genetic algorithm with two-dimensional reduction technique</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>Using CBR to facilitate the generation of new product ideas</td>
<td>Retrieved benchmarking products with its important attributes</td>
<td>500</td>
<td>User defined with preference</td>
</tr>
<tr>
<td>Construction management</td>
<td>Development of a CBR construction cost estimating</td>
<td>Cost value</td>
<td>540</td>
<td>Analytical hierarchy process/ equal weight/gradient descent method</td>
</tr>
<tr>
<td>Software and knowledge engineering</td>
<td>Estimate Web hypermedia development effort</td>
<td>Cost value</td>
<td>25</td>
<td>Mean, median, and inverse rank weighted mean</td>
</tr>
</tbody>
</table>
Several studies have identified CBR as mostly appropriate for application to the theoretical stage of domain knowledge (Chantaraskul & Cuthbert, 2005; Gang, 2005). Furthermore, the use of Case-Based Reasoning has grown in constructivist learning environments with More than 50 simulation-based e-learning vendors uses CBR (Chapman, 2003; Aldrich, 2004).

In addition to those applications, many CBR shells are available on the market. “For example, Case Advisor is a Windows-based, and easy to use CBR shell marketed by Sentential Software in Canada” (Yang et al., 1997). The software includes three components: Case Advisor Authoring, Case Advisor Problem Resolution, and Case Advisor Web Server, a utility to use case-bases on the Web. Table 2.2 lists the major CBR shells.

<table>
<thead>
<tr>
<th>Product</th>
<th>Platform</th>
<th>Representation</th>
<th>Retrieval</th>
<th>Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>ART Enterprise</td>
<td>PC, Workstation</td>
<td>flat attribute: value pairs supporting a full range of variable types</td>
<td>Nearest-neighbour</td>
<td>Fully featured GUI builder</td>
</tr>
<tr>
<td>Case Advisor</td>
<td>PC Windows</td>
<td>Flat records supporting text and weighted questions</td>
<td>Nearest-neighbour and knowledge-guided</td>
<td>Use Netscape</td>
</tr>
<tr>
<td>CBR3</td>
<td>PC Windows</td>
<td>Flat records supporting text and weighted questions</td>
<td>Nearest-neighbour and knowledge-guided</td>
<td>Case Point available as a DLL or API and CGI scripts</td>
</tr>
<tr>
<td>Eclipse</td>
<td>Any ANSI C environment</td>
<td>Flat attribute</td>
<td>Nearest-neighbour</td>
<td>No interface, only supply as a C library</td>
</tr>
<tr>
<td>ESTEEM</td>
<td>PC Windows</td>
<td>Case can be nested with inductive weight generation</td>
<td>Nearest-neighbour and induction</td>
<td>Simple form-based GUI builder</td>
</tr>
<tr>
<td>KATE</td>
<td>PC Windows and UNIX</td>
<td>Hierarchical cases</td>
<td>Nearest-neighbour and induction</td>
<td>Tool Book interface can be customized</td>
</tr>
</tbody>
</table>

*Table 2.2: Summary of the main Case-Based Reasoning Shells (Watson, 1997)*
A final developing field of application of CBR worth mentioning is geographical information systems (GIS). The approach consists of combining CBR and GIS to solve spatial reasoning problems (Holt, 1999).

This section has focused on the successful applications of CBR technology. However, it is also important to state that certain problem domains are not very appropriate to CBR. These domains can be characterised by one or more of the following:

1. Lack of relevant cases, when dealing with an entirely new field.
2. Few cases available due to a lack of scientifically organised data.
3. The problem domain can be easily modelled and is well understood (Althoff, 2001).

2.6 Web-based Information Systems

The World Wide Web (WWW) was the main factor for the exceptional growth of the Web information systems and applications. “The Internet transcends national and geographical boundaries and has brought about unprecedented opportunities for software deployment to satisfy the application needs of all walks of life” (Bao-wen, 2004).

Web-based information systems (WBIS) are an expansion of decision support systems, as a major function of a WBIS is to provide information to users who make purchasing decisions. Madey defined Web-based information systems as “an emergent class of information systems that utilize Internet technology and are deployed on the Internet” (Madey, 2001).

Over the recent years the use of Web based applications have grown radically. There are many situations where traditional software based applications and systems could be improved by converting them to a web based application. Below are some of the advantages of web based applications:

Platform compatibility

Most web based applications are more compatible across platforms than traditional installed systems. Normally the minimum requirement would be a web browser. These web browsers are available for a large number of operating systems and so whether you use Windows, Linux or Mac OS you can still run the web application.

More manageable
Web based systems only need to be installed on the server. This makes maintaining and updating the system much easier as it can all be done on the server.

**Less environmental clashes**

Web based software generally has fewer bugs, because it is not depending on any of the hardware or environment settings in the OS that may generally cause a problem.

**No installation required**

Browser based software never requires an installation processes or hard drive space. It lives in the Internet and this also means that whenever you launch it, it always has the latest version.

**Secured data**

Typically, in larger, more complex systems, data are stored and moved around separate systems and data sources. In web based systems, storage systems, which large systems usually use to store and move data around, and processes can often be combined reducing the need to move data around.

**Reduced costs**

Web based systems can significantly lower costs due to reduced support and maintenance, lower requirements on the end user system and easy design.

**Updates are seamless**

Instead of having to patch each and every individual user, the patches/upgrades are applied to the server and each user received the updated version the next time they log in.

**No legacy**

This is a big issue for traditional software vendors. Users who purchase previous versions of a software product will almost always have legacy versions which need support.

**Available anywhere, anytime**

In the same way that people can access their email from any browser, web apps are also available 24 hours a day, 7 days a week.
The discussion regarding system development methods has gained interest in the context of web development (Madsen, 2000). Deshpande argues that system development methods are applicable for web development (Deshpande, 2001), however, Carstensen argues that entirely new methods and approaches are required as the development of web-based systems is different (Carstensen & Vogelsang, 2001).

Web-based development systems differ from traditional systems since they need a higher level of interface design, graphical presentation and animations, and focus deeply on user interaction (Kline, 1992). The development characteristics of these systems include (Barton, 1991):

- Put a strong emphasis on graphical presentation of data.
- Require regular updating to keep information current.
- Combine the use of animations, graphics, sound, and text information.
- Emphasize creating an effective experience versus.
- Depend on fast evolving and changing technologies and standards.
- Are critical to the presentation of the project focus.

Because of these uniqueness, “these development efforts require a development life-cycle characterized by the development of models to allow users to interact and react to the presentation of data and information as the system is being developed” (Kline, 1992)

### 2.6.1 Web-based CBR Systems

Web-based systems are “a promising solution to an age-old need: fast and flexible information sharing among people and businesses” (Beznosov et al., 2005).

Web-based applications have evolved notably over recent years, and with improvements in security and technology, plenty of scenarios can be found in which traditional software-based applications and systems could be improved by converting them to a web-based application.

Most CBR systems are loaded on a local device and run under the user operating
system, which creates problems of inconvenience and high cost (Watson & Gardingen, 1999). Thus, the Web-based CBR systems offer a capable alternative, because the Internet gives access to CBR web systems that can be accessed with a web browser without time and location limits. In addition to that, Web-based CBR has several other advantages over the traditional CBR systems (Doyle et al., 1998):

- Has platform freedom. The Internet permits a single shared web-based application to be used on any platform.
- Response-time advantages for the user.
- Provides expert information over a network.
- Easier to gather new experience and update the case database.

Furthermore, the World Wide Web makes the CBR a powerful tool with the following features (Toussaint & Cheng, 2006): (a) A web-based system can generate requests dynamically for end users; (b) The system can be accessed from anywhere with Internet access; (c) The system can be updated and scaled up by adding additional functions; (d) The system is based on a three-tier architecture that increases the security and efficiency via networks; and (e) The entire application can be developed for a minimal financial investment.

Another attribute of Web-based CBR Systems is that they engage the implementations of existing CBR technology in a Web framework. Thus, adding intelligence to e-commerce systems and other Internet systems is a significant role for Case-Based Reasoning (Finnie, 2003).

### 2.7 Summary

Second Life is a Web-based virtual world developed by California-based Linden Research, Inc. currently it is the largest virtual world, with tens of millions of square meters of virtual lands and more than 13 million registered users. It has attracted significant interest from business and service industry sectors throughout the world. However, a distinct lack of software methodologies used in the development and implementation of objects in SL has been noted.

A software methodology is a systematic approach which tell you what steps to take and how to perform those steps. And it could be seen as a mix of techniques, tools, case studies,
design, coding and testing. A technique indicates how an activity should be undertaken; a tool is linked to a technique and is used to ensure that an activity is undertaken in the most effective way (Madsen, 2000).

After researching and examining a variety of different software engineering methods and techniques, this research project methodology will be based on Case-Based Reasoning (CBR) techniques which shares a number of synergies with Second Life itself (See Chapter 3), and uses the web-based technology to develop a web-based system, which based on CBR to work in accordance with Second Life.
Chapter 3  

EXPERIMENTS INSIDE SECOND LIFE

3.1 Introduction

With regard to objective (3) of the Ph.D. research, this chapter will describe the creation of an experimental Second Life “land”. The aim is to find out the necessities required to build and develop lands within Second Life, and gain personal experience to be able to evaluate what types of software methods or techniques are required and which are better. In addition, the chapter will describe interviews conducted inside Second Life to verify the findings from the literature about the use of systematic methodologies for Second Life development, and to discover whether any methodology is used in practice.

To understand how the SL virtual world works, experiments were needed as a starting point of the research work. All of these experiments were conducted inside the virtual world to expand the practical knowledge of the most important things inside SL. This included:

- How the building is done in SL, and
- What it is like inside SL/companies and residences.

3.2 Building a land inside SL

Building a land was the first step to learning how to build and create objects and communicate with others. To build inside SL, users need a residence: a place to call their own, a starting point for the journeys in SL, and a place where experiments with building, objects, holding events, sharing ideas, planning group projects, etc. could take place. Therefore, users need to acquire some virtual land.

Owning land in Second Life lets users have an ongoing presence in the world for a home, business, or whatever other special place they have created. Users can acquire land in two ways. The first is to buy it from Linden Labs, which requires a premium account, and the second is to rent it from other land or estate owners.

After acquiring the land, the next thing needed is a house that will fit into the space purchased, in the case of this research, this was 512 square meters. In the real world,
construction of a house involves a lot of work. A builder will need to hire a construction company and spend hours looking at a number of house plans. In contrast, in Second Life, the owner can simply build a house in minutes by using Second Life’s building and creation tools.

Once the house is placed on the land, the next thing to do is furnish it. Again, owners can either build the furniture/objects or obtain free furniture. If builders have Linden dollars, they can buy goods from the many stores and shops located all over Second Life. After that, it is just a matter of meeting new people and inviting them over to one’s new home.

New objects in Second Life are created through building, which is done through a relatively intuitive interface; and scripting, which allows the user to attach scripts in Linden Scripting Language to any built object. “The combination of these capacities with a realistic physics engine creates nearly unlimited potential. Combined with an avatar’s ability to fly and teleport, it provides the setting for imaginative and fascinating hours of construction” (OpenSim, 2008).

The Linden Scripting Language (LSL) is used in Second Life to breathe life into objects, such as animating an object or creating different poses for an avatar. It was interesting to observe that the Linden Scripting Language looks a lot like the Java programming language.

There is also a built-in library inside Second Life. Inside this library can be found any things that users might either want or change to match their requirements. This means that users only need minimal development of some skills in writing code using script language developed by Second Life.

This is the basic idea of building objects in Second Life (See Figure 3.1):

1. Create an object of a given shape, most often a cube.
2. Change the dimensions of the object in the X, Y, and Z dimensions (west-east, south-north, and down-up).
3. Move the object where the user wants it to be.
4. Apply a texture to the object to put a pattern on its surface.
5. Add a script to add some behaviour.
6. Repeat the above to make more than one object, or one object with multiple parts (OpenSim, 2008).
3.3 Summary

From building a land inside the second life environment all the necessities required to build and develop lands within the virtual world have been outlined and understood. In order to build a land inside SL objects should be used. Three types of objects were distinguished, which are: Modifiable objects, Copiable objects and Transferable objects. These Objects are ranging in price from free to thousands of Second Life dollars. The free objects are often quite basic with limited functionality depending on what you want it for; some of these may be perfectly adequate.

In order to find objects in SL, users must travel between the virtual lands inside the Second Life environment to search and select the appropriate ones that match their requirements. Another alternative is by visiting one of the help lands inside Second Life and asking for advice and help from other residents. Also some websites have object lists available from which users can choose. Those options make the process of finding and obtaining objects within the virtual world easier. However, it may take a long period of time and effort from users to find what they need and sometimes they have to use what is available rather than what they exactly need. Therefore a more helpful and effective tool would be very useful for users to find exactly what they are looking for and provide them with adequate help and support in developing within Second Life.
In addition to that, from practising the Linden Scripting Language (LSL) for building inside the virtual world it becomes easier to create and edit objects as the programming skills improve with time. Moreover, the land gave the opportunity to invite and meet new people inside the virtual world and this enabled the sharing of ideas and suggestions with them about creating a tool to help them in developing within Second Life. It also acted as a platform for the studies and experiments for the research project.

3.4 Interviews and Studies Conducted inside Second Life

Interviews were used to gather self experiences, opinions, preferences and behavioural motivations. Interviews can be structured, semi-structured, or unstructured. “Interviews are often carried out after a test session to gather a user’s opinion, such as the user’s satisfaction with the system” (Gena et al., 2001).

This study looks at two aspects. Firstly, it examines whether any of the companies inside SL applied any methodology in developing their lands.

Secondly, interviews were performed with users in the SL environment to gain their feedback and provide insight into Second Life as a whole.

3.4.1 SL Companies

Regarding IBM’s multi-million dollar investment in Second Life, Maggie Blayney, director of Global Web Strategy & Innovation for IBM said: “The real reason why we're doing this is because we do feel the beginning of a major transformation on how people are going to interact on the Web - going from a flat to an immersive experience... It's not going to replace the two-dimensional Web but it's going to integrate and complement it” (Reuters, 2007).

Interviews were conducted inside Second Life to establish whether any of the major companies involved applied recognised software methodologies in developing their own lands.

The research was semi-structured and interview-based and involved more than 30 companies which cover the different sectors of real world companies involved in Second Life including IBM, HP, Dell, Mercedes Benz, Orange, Coca Cola and Sky. Each company was contacted by locating their lands in Second Life and booking appointments with their representatives. All conferences took place in Second Life according to the company’s
schedule, and one of the key questions was, “Did developers use any modeling languages?” (See appendix A).

After conducting the interviews with companies inside SL, it was apparent that only one company, IBM, used software methodologies within SL (see Figure 3.2). The system that they used to build their islands in Second Life was simple use cases. However, they still think that modelling could help in developing lands inside the Second Life environment.

![IBM in SL](image)

**Figure 3-2:** IBM in SL

### 3.4.2 SL Users

Following this preliminary study, more interviews were carried out using a random selection of more than 100 Second Life users who came from different backgrounds and ages. All interviews took place in Second Life by visiting the most popular lands there.

Several interviews with users in the SL environment were performed. The most important question asked was whether the users required any method to facilitate their building within SL (See appendix A).

The feedback from individuals implied that they preferred to have pre-existing objects ready rather than having to create their own (see Table 3.1). The new users generally relied on the past experience of previous users in order to find the objects that matched their requirements. Furthermore, their responses identified that they wanted a system to be able to build their objects using existing ones because it would make their experience in Second Life much easier.
Table 3-1: major questions and their responses

<table>
<thead>
<tr>
<th>Do you prefer to have existing ready objects rather than creating your own?</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ 95% stated that they preferred to have pre-existing objects.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Do you require any method to facilitate your building within SL?</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ 88% stated that the system helped them find the object they required.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Do you think your computer limits your experience in SL?</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ 70% stated that they don’t have problems and SL software is working and loading fine, however 30% stated that they have problems in loading and login into SL.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What do you think of the technology of SL?</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ 75% stated that the technology of SL is amazing; however 15% stated that it’s still basic but will get better with time.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How would you rank your skills in using the built-in Second Life programming language?</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ 15% stated that LSL is easy to use and straight forward; however these users stated they had some background in programming before using other languages. Furthermore, 60% of the users stated they have difficulties with using the LSL language and the other 25% stated that they rarely use it.</td>
</tr>
</tbody>
</table>

Overall, the research clearly showed that most of the users within the virtual world were not familiar with how to use the built-in Second Life programming language that is available to construct new objects in the virtual world. Furthermore, supplementary searches of the Internet and Second Life were carried out to determine whether any tools have been designed specifically for Second Life. The only result found was a trade website offering objects for sale to Second Life users.

The findings from the interviews conducted inside SL can be summarized as follows:
Most of the users use the virtual world on daily bases with each log typically lasting between 5 and 6 hours.

The majority of the users stated that the technology of Second Life is amazing and user friendly. One user stated “People don't give it enough credit. Linden Labs have created something that is massive in its scale and unlimited in its potential. It is genius”.

Second life still has few technical problems as some of the users stated that their computer limited their experience in the virtual world.

Users within the virtual world were generally not familiar with using the built-in Second Life programming language (The Linden Scripting Language).

Second Life users implied that they preferred to have pre-existing objects ready rather than having to create their own.

Interviews with companies inside SL showed that only one company, IBM, used some basic use case development in building their islands inside Second Life. Other companies like “The Sun Microsystems” stated that modelling is not important and they used a graphic program called Maya to build their land in SL. However, the majority still think that modelling could help in developing lands inside the Second Life environment.

All of the Interview questions and responses can be found in appendix A.

3.5 Summary

Second Life has become a most attractive and engaging on-line environment in recent years. Users can design and direct the avatars to play fictitious characters in this world. Second Life has made it possible to let users visit and communicate in an incredible 3D world with people in reality. As a result their skills can be greatly improved in the long run.

Furthermore, after researching CBR and SL in chapter 2, and from the finding from this chapter; Case-Based Reasoning is identified through its process cycle to be the most appropriate technique to be used in accordance with SL due to the synergies between the two methods, which are listed below:

One of the main attributes of CBR is that it continuously updates its database and the creation of knowledge depending on the feedback by its users. SL’s own users create
its knowledge base, which is constantly updated. Thus, the CBR system is appropriate to use with SL for this purpose.

- Unless an object is built “from scratch”, building in SL depends on the objects that are available within it at the time of development. To assist in this, some websites have object lists available from which users could choose. In theory, the vast availability of the objects in store in Second Life allows users to find appropriate objects they wish to build. Thus, if the users know where to look, they can find a close and often exact match to their requirements without having to build the object from scratch. This is similar to what CBR does because the main process in CBR adapts old solutions to meet new demands. It uses old cases to explain new situations and creates new solutions to the new problem.

- From the analysis in chapter 2 of the most common software methods and techniques, it is apparent that most of them possess certain phases that are not required in Second Life. Second Life only requires the users to see what others have previously built, and then decide what they want to use or edit from them. After researching CBR, it was apparent that those requirements are available in the retrieval and adaptation phases.

- Second Life largely depends on the users within it and the feedback they produce. From this feedback, the users usually require changes; therefore, a method must be in place to adapt according to their demands. In the CBR adaptation phase, a specific part deals with adapting the cases entered in order to match more closely to stored cases.

- Second Life users come from different backgrounds and ages; therefore, most of the users within the virtual world are not familiar with programming languages. In order to build in SL, it is easier for the users to use existing objects. CBR employs a database in which the previous cases are all available. The new case entered is directly compared to these previous cases, and users find those that most closely match their requirements. The same idea is applied in Second Life, where the users can directly find the objects they want.

- The numbers of users entering the virtual world of Second Life have greatly increased. Several interviews with users on SL revealed that they prefer to work with existing ready objects than having to create their own. The new users depend on the past use of
objects by previous users in order to find the objects that most closely match their requirements.

- In Second Life, the idea of the whole virtual world was built around the creation of its own users, and the users themselves have the capacity to control their entire surrounding environment. Therefore, a modified CBR tool which gives the users the ability to control and adjust the list of solutions provided would be an appropriate enhancement to CBR for use with SL.

From the above observations it is clear that CBR should work well with SL. If CBR can be used to inform users about which existing objects in SL are available and most suit their needs then this would significantly improve the users’ ability to develop their lands using the preferred method of copying existing objects and modifying them where necessary. It was therefore decided to build a CBR system for this purpose, and this is described in the next chapter.
Chapter 4  
A System designed using Case-Based Reasoning (CBR) for building in the Second Life (SL) virtual environment

4.1 Introduction

In regard to Objective (5) of the research, this chapter discusses the building of a Case-Based Reasoning web-based system to determine if practical benefits can be obtained from such a system to assist in Second Life development.

Web-based systems have become popular around the world due to the worldwide expansion of networks, as well as the ubiquity of the clients who use them. The ability to update and maintain web-based systems without distributing and installing software on thousands of client computers is a key reason for their popularity. In the previous chapters, Case-Based Reasoning was identified as potentially the best system to be used with virtual worlds to provide a tool for SL developers to locate the cases they need in the SL environment. In this section, the steps performed by a CBR tool for SL users are explained. The system has been further modified to serve SL practices more effectively, which will be explained later in this section.

4.2 Data Management

The database contains relational models in which the information about a new problem is stored. Based on the relational data model, useful information can be retrieved. This information is necessary to retrieve the desired objects present within the database. For the development of the CBR web tool, the PHP5 language and Apache web server are used, and MySQL is used for the database. Users interact with the CBR system throughout the Internet using a Web Browser.

The SL environment was examined to identify all the categories of objects available. These categories are shown in Figure 4.1. Within these categories are subcategories that contain all the available objects that can be accessed or used within the whole SL environment.
The system database is divided into three tables. A huge number of various SL objects were stored in the first one, including their attributes of name, description category, subcategory and the price of each object with the weight of each attribute which will be used by the matching function to calculate the similarity. The second table contains the cases that the users stored in the system. It is a dynamic table that is updated automatically from the users’ input. The third table stores temporary data used in the calculation of the similarity values to derive the final result. Every time a new user builds a new case, the temporary values are cleared as new calculations are made. The data management concept makes the whole process of obtaining the results faster and more accurate.

Figure 4.4-1: The available categories within SL (snapshot of the first step of the system)

4.3 CBR Web Tool Phases

4.3.1 The Initial Phase

The data retrieval phase is the initial phase that is performed after defining the attribute values of the objects required. Similar previous objects are retrieved by searching for objects
that match the desired object’s attributes. A set of steps is followed until the best matching case is defined. The steps are:

1) The set of problem descriptors are defined.
2) These descriptors are then compared with those of objects within the database, and the most appropriate existing objects are selected.
3) The final step is for the best case to be chosen from the closest matching objects already defined in the database.

4.3.2 Matching Function

The matching function is performed to assess the cases most similar to the one being studied. This function is shown in Equation 1, in which \( n \) is the number of descriptors, \( w \) is the summation of the weights, \( x \) is the weight of the new case and \( y \) is the weight of the existing case. The cases that obtain higher scores are more similar to the new case and will be retrieved before the cases with lower scores. Several methods of comparison can be used in CBR. The k-nearest-neighbour technique (KNN) is used here. In this method, each attribute is allocated the same weight. For the SL development tool, the KNN method is modified so each descriptor is given a weight; the system acts dynamically to change the weights used.

\[
\text{Similarity} = \frac{\sum_{i=1}^{n} w_i \times Z_i}{\sum_{i=1}^{n} w_i} \quad \text{if } x_i < y_i \quad \text{then}
\]

\[
Z_i = \frac{x_i}{y_i} \quad \text{else} \quad Z_i = \frac{y_i}{x_i}
\]

(1)

The retrieval of the previous cases was performed using a similarity equation whereby the results of the new problem were obtained. This equation works by the summation of the weights of each of the descriptors of the new case multiplied by the ratio between the new case and the stored one. This summation is then divided by the total for each of the attributes of the new case. The method used in obtaining the ratio is as follows: If the value of the new case is bigger, it is placed in the numerator and divided by the value of the stored case in the denominator. If the value of the stored case is bigger, then the opposite occurs. The value that results from this equation is then multiplied by 100, and the result is the percentage of similarity between both cases.

The weights were chosen according to six descriptors, which are:
Categories: Second Life was examined to identify all the categories available. 17 categories were recognized which cover all the objects and items within the SL environment.

Subcategories: Various subcategories are designated for each category, and the values depend on the main category.

Modifiable: This boolean term simply identifies whether the SL object can be modified.

Copiable: This boolean descriptor means that the users have the ability to create copies of the same object.

Transferable: This boolean attribute means that one user is able to send this object to another user.

Price: This category has a range of five values related to the price of the object. These values cover all the possible price ranges for objects and items in Second Life.

For these descriptors, the first two, category and subcategory, are not allocated a weight; however, the other four are allocated dynamically by allocating a priority option for each one as High, Normal or Low. The priority chosen changes the weight of the descriptor. This process will be further explained in the next phase (Data adoption/reuse phase).

4.3.3 Adaptation Phase

Adaptation is performed in the form of the priorities allocated to the four descriptors in the new case. These descriptors are given weights according to the priority chosen for each descriptor. The user chooses one of three priorities for each descriptor. These priorities rank from High to Normal to Low, as shown in Figure 4.3. In the case of Normal, the weight assigned to the descriptor remains unaltered and the descriptor weight is unchanged. In the case
of High or Low priorities, a constant value is added to or subtracted from the original weight to allow the priority to be taken into account.

After conducting several tests, the best constant increment or decrement to change the weight of the descriptor was found. This value was chosen by trial and error until the best possible value that would reasonably change the weight was reached to enable the retrieval of matching objects closer to that desired.

The option of searching with alternative search criteria was introduced. This practice enables the user to change any weight assigned to a descriptor, which will change the similarities of the retrieved cases by changing the results of the similarity equation. In that way, the ranks of the ten cases received will change to better fit the user’s needs.

Figure 4.4-3: The priorities are shown next to the descriptors to be chosen (snapshot of the 3rd step of the system)

4.4 Second Version of the CBR Web Tool

4.4.1 The New Version

Collecting and analyzing the feedback for the first version indicated the adjustments and improvements needed. This feedback came from Second Life users, my colleagues, friends and conference attendances. Instant feedback form was used to collect their ideas and suggestions after using the first version. A total of 50 responses were gained, suggesting that the first version of the CBR tool was satisfactory as a proof of concept; However, There are a
number of areas where the system still needs improvement to be fully usable for wider use. Problem areas include the system design and interface, the efficiency of the retrieval process and the availability of objects in the database.

By performing these adjustments and testing them, the system became increasingly useful for users who wished to access items and objects within SL. In addition, new functionalities have been added in the improved version to refine it and make it into a highly effective SL development tool. Other changes include creating a dynamic database, applying new feedback platforms, implementing the adjusting phase and changing the system design – these are described in the next sections.

4.4.2 Reasons for Changing

The second version of the CBR web tool has been implemented for the following reasons:

1) Collecting and analyzing the feedback for the first version identified the need for improvements. This feedback came from SL users, my colleagues, friends and conference attendances.
2) The need for new functionalities to increase the validity and reliability of the CBR web tool was identified.
3) Considering the research side of this project, improvements have been implemented in this version to enhance the research value of the project.
4) The need was demonstrated for new interface and design to make the CBR web tool more presentable and understandable for the users.

4.4.3 New Functionality

New functionality was added in the improved version of the system to refine it and develop it into a highly effective SL development tool. This functionality is presented in Table 4.1.
Table 4-4-1: Additional Functionality

<table>
<thead>
<tr>
<th>Name</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjusting Phase</td>
<td>The adjust phase has been implemented and dynamically connected to the matching function by allocating a new weight for an attribute in the similarity equation.</td>
</tr>
<tr>
<td>Dynamic Database</td>
<td>The most important element of the CBR method is to be able to find solutions similar to the case being solved in the existing cases database (Kowalski et al., 2005). A new section has been added that permits users to add objects in the database, to enlarge the availability of objects and continuously update the database so the system will become increasingly useful for users.</td>
</tr>
<tr>
<td>Feedback Platforms</td>
<td>New feedback platforms have been provided and are further discussed in the next section of this paper. These platforms facilitate the use of the system and obtain results more closely related to the users’ needs.</td>
</tr>
<tr>
<td>System Design</td>
<td>The design of a system is important for it to be complete and usable. In a process of continual improvement, a new design has been implemented to make it more presentable for users.</td>
</tr>
</tbody>
</table>

4.5 Methodology for developing lands inside Second Life

Users of the system must go through four steps to reach their goal. In each step, they obtain part of their requirements. The system is designed to integrate this information so that the solution fully matches the user’s needs.

The SL environment is an entire world, and to build within it one must start from the smallest component—an SL object, in this case. SL objects vary from a small chair or plant to large mansions. By combining objects, one can build a land and start a journey and life in this virtual world.
Thus, the SL environment was examined and various kinds of SL objects were studied to find the most valuable attributes inside it. Therefore, in each step, the tool was designed to retrieve and clarify one of the attributes of the desired solution and the level of importance for the user. With each step, the solution becomes more closely aligned with the user’s recommendations.

In the previous sections, the CBR web tool’s mechanical phases were explained in detail, including the data retrieval process, matching function, dynamic weighting system and adaptation phase, which the system uses to find the best matching solution. However, this section further explains the steps that users will go through until they find a solution.

4.5.1 Step One

In this step, the category of the desired object is chosen. The user can choose from 17 categories in the web tool; these categories cover all the objects within the SL environment. These categories are: Animals, Animations, Apparel, Art, Audio and Video, Avatar Accessories, Avatar Appearance, Building Components, Business, Celebrations, Gadgets, Home and Garden, Miscellaneous, Recreation and Entertainment, LSL Scripts, Vehicles and Weapons. Users will choose the nearest category to their target. For example, if users want to build a house in this step, they have to choose category no. 8, which represents building components (see Figure 4.4).

![Figure 4.4-4: Step 1 of the system process](image-url)
4.5.2 Step Two

In this step, users become more specific about their desired target by choosing a sub-category. Each category has many sub-categories that hold within them all the available objects that can be accessed or used within the whole SL environment. Thus, if the users are still trying to build a house, they have to choose Residential Structures as a sub-category of building components (see Figure 4.5).

![Figure 4.4-5: Step 2 of the system process](image)

4.5.3 Step Three

In this step, users have the option of setting the permissions for their desired objects by allocating a priority feature to each one of the attributes. Three types of permissions are given here, which are:

- Modifiable: This attribute lets the users identify whether or not their SL object can be modified. In addition, they can decide the level of importance for this attribute by using the priority feature allocated to it. For example, if the users feel this object must be modifiable, they will set the priority level for modifiable to “High”.
Chapter 4. A System designed using Case-Based Reasoning (CBR) for building in the Second Life (SL) virtual environment

- Copiable: By choosing this option, users identify their need for the desired object to be able to create copies of itself. The user can also use the priority feature by choosing one of the three levels of importance.
- Transferable: The last attribute gives the users the ability to send their desired object to another user. The priority feature is also available here (See Figure 4.6).

**Figure 4.4-6:** Step 3 of the system process

### 4.5.4 Step Four

In this step, the users select their ideal price for the desired object from five price ranges. Having examined the objects and items within Second Life; these five values cover all the possible price ranges available for objects and items within the virtual environment (See figure 4.7). The priority feature is also available so the user can decide how essential this range of price chosen is.
By identifying these attributes, the tool will come closer to finding users the best solution that matches their recommendations. Therefore, after finishing these four steps, the CBR tool is now able to provide users with a list of solutions for their specifications (see Figure 4.8). Users then have two options: first, to choose one of the given solutions that will direct them to the objects wanted; and second, the option to obtain more accurate results by using the **adjusting feature** (See figure 4.9).
This new attribute, “Adjusting feature”, changes the similarities of the retrieved solutions by dynamically adjusting the similarity equation. This adjustment changes the ranks of the cases retrieved to better fit the users’ needs. The users can then choose one of the adjusted solutions, which will direct them to the objects that further match their demands (see Figure 4.11). For example, for the users who wanted to build a house, the tool would provide a list of solutions that matched their demands. Then, if they wanted the most furnished house, or the one with a parking space, they could clear that by using the adjusting feature, which would enable the tool to provide an updated list of solutions that best matched the claim (see Figure 4.10).
Figure 4.4-11: The system will direct users to their desired objects inside SL.

Figure 4.12 shows a flowchart that summarizes the process the CBR web tool uses, including:

- The four steps allowing the system to collect the users’ requirements and elaborate the functional and technical specifications of the desired solution.
- Adjustment and retrieval phases that supply the users with the precise solution and dynamically adjust it to better fit their needs.
- By employing feedback from the users, improvements can be made to enable the system to be adjusted according to their demands. By performing these adjustments and testing them, the CBR web tool will become more helpful for SL users.
Chapter 4. A System designed using Case-Based Reasoning (CBR) for building in the Second Life (SL) virtual environment

Example usage and User scenario

Below is an example of the system and an explanation to how it works. Suppose that User ‘A’ (see Figure 4.13) wants a building to use it as a car showroom to sell cars with a budget of 5000 SL money (L$). To demonstrate the system from the user’s point of view, Figure 4.13 shows how the system evolves in a number of steps as follows:

![System Work chart diagram](image-url)
Figure 4.4-13: Use Case Diagram. To demonstrate the system from the user’s point of view, this figure shows how the system evolves in a number of steps to help User ‘A’.

- User ‘A’ enters the system using a Web browser,
- He starts by asking for help in building in SL.
- He starts entering his requirements for processing and analyzing. In step 1 he chooses “building component” from the category list.
- Then in step 2, User ‘A’ choses “Commercial Structures” from the sub-category list.
Chapter 4. A System designed using Case-Based Reasoning (CBR) for building in the Second Life (SL) virtual environment

- Then in step 3, User ‘A’ choses copiable as a type for his desired object. He also shows that it is important for him by setting the level of priority as High as he plans to open more than one car show room in SL.
- Then in step 4 User ‘A’ selects his ideal price range “3000 to 5000”.
- These requirements are sent to the system solution case retrieval process to find the best solution from the cases database by using the similarity calculations and the matching function.
- The output is a list of recommended case solutions that match the requirements of User ‘A’.
- User ‘A’ decides that he didn’t find what he exactly wanted. Although he found a nearly suitable building, it still needs modification as he noted "None of the buildings is totally suitable because you can’t get a car in and out of the door!"
- Then the system recommends altering the requirements by updating the object type and User ‘A’ adds a new attribute, 'Modifiable' and set its priority as ‘High’
- These updated requirements are sent to the system solution case retrieval process to find a better solution by adjusting the similarity calculations and the matching function.
- A new, slightly different list is given to User ‘A’ that better matches his updated requirements.
- User ‘A’ now decides that he has found his desired object and this case solution is stored in the database for future searches as a good case for the specified attributes.
- User ‘A’ modifies his building to enlarge the doors so that a car can be taken in and out of his showroom.
- At the end, User ‘A’ decided to add his modifiable building to the objects database to used by other users by using the ‘add object’ feature in the system.

This example has shown how a user can incrementally refine his requirements to obtain the object that best suits his requirements. It also shows how the tool itself benefits from this use by the corresponding improvements to the case solutions stored and from the additions to the database from users adding new versions of the objects they have developed. The system, therefore, should become ever more useful to others each time it is used in this way.

4.6 Concluding Remarks

From the initial analysis, it appeared that CBR systems would be the best for use in building in SL practices; however, in practice, some of the steps in the CBR system needed to
be changed to make it more applicable to SL. This modification was achieved by introducing a new method in the adaptation process in which priorities changed the weights of the descriptors, as opposed to using the KNN technique, in which the weights were equal for all descriptors.

The first version of the web tool was satisfactory as a proof of concept, but not as a generally useful system for Second Life. Therefore, a number of changes were implemented to address these problems and make it a more practical tool. In addition, new functionalities were added in the improved version to refine and develop it into a highly effective SL development tool.

Furthermore, by employing feedback from the users, improvements can be made to allow the system to be adjusted according to their demands. It was intended that future developments in this project would incorporate the users’ feedback to make the tool yet more effective in assisting SL development. Some steps in this respect are described in the next chapter.
CHAPTER 5  CBR WEB TOOL CONTINUOUS FEEDBACK APPROACHES

5.1 Introduction

In regard to Objective (6) of the research, this chapter discusses the use of the Second Life users’ continuous feedback to enhance the CBR tool and the Second Life development methodology.

Feedback obtained from users significantly enriches the design process, which thus leads to new ideas and better results (Rosen & Salomon, 2007). This feedback gives developers the needed information for improvements that match the user’s needs in different situations (Meisalo, 2005). Continuous feedback allows improvements to be made to the system such that it can be adjusted according to the users’ demands. The mechanisms for the continuous feedback the system provides in this research project were based on four approaches: dynamic weights, advertising, feedback services, and case studies. These approaches will be described in the next sections.

5.2 The Use of Dynamic Weights

Dynamic weights can change the significance of the search parameters, altering the search results to become more similar to the users’ needs (de Hugo & Hoeschl, 2003).

The k-nearest-neighbour technique is used here. In this method, each attribute is normally allocated the same weight. For the SL development tool, the KNN method was modified so that each descriptor was given a weight; the system acted dynamically to change the weights used.

The equation used was adjusted with a method of dynamic weighting to be more accurate in the results obtained after the keywords were entered.

The way Dynamic Weights are used is based on three phases:

1) The first phase is performed in the form of the priorities allocated to the four descriptors in the new case. These descriptors are given weights according to the priority chosen for each descriptor. The user chooses one of three priorities for each descriptor, which rank
from High to Normal to Low. These three values will clearly demonstrate to what extent the chosen feature is important to the user and this can be done by changing the default value of ‘Normal’ to ‘High’ or ‘Low’. In the case of Normal, the weight assigned to the descriptor remains unaltered, and the descriptor weight is unchanged. In the case of High or Low priorities, a constant value is added to or subtracted from the original weight to allow the priority to be taken into account. After conducting several tests, the best constant increment or decrement to change the weight of the descriptor was found. In our computations, the value ‘0.2’ was used (see Figure 5.1); this value was chosen by trial and error until the best possible value that would reasonably change the weight was reached, such that the value made the retrieval of matching objects closer to those desired.

Figure 5.0-1. This source code shows how the priority value ‘0.2’ is used in the CBR tool. Also some parts of the CBR web system source code is given in Appendix D.

2) In the second phase, the option of searching with alternative search criteria is introduced. This option gives the user a chance to adjust the results by changing the value of the ratio of similarity between the cases by adjusting their weights. This adjustment will change the similarities of the retrieved cases by altering the results of the similarity equation so that the ranks of the solution cases received will adjust to better fit the user’s needs.
3) The third phase is performed by asking the users direct questions when they use a specific case so that the case solutions retrieved are evaluated. Two results may be produced:

- If the user decides the result is successful, this assessment is noted, and the case that was most appropriate is stored in the database for future searches as a good case for the specified attributes. This case will then be used in any new searches with similar attribute values in order to learn from the success.

- If the results are unsuccessful, then the case base may be adjusted to improve the results returned by the matching process. In such cases, the descriptor attributes for some objects may be adjusted so that future similar object searches will give more satisfactory results.

### 5.3 Advertising inside Second Life

Arens (2007) defined Advertising as “the structured and composed non-personal communication of information usually paid for and persuasive in nature, about products (goods, services, and ideas) of identified sponsors through various media”. Two types of advertising connected with Second Life must be separated: advertising with Second Life and advertising in Second Life. The difference is that advertising with Second Life relates to using Second Life for marketing. Advertising in Second Life relates to all measures and activities within the Second Life world to promote and support an offer, product, service or corporation.

Feedback can come in many forms in advertising, which are: redeemed coupons, phone inquiries, visits to a store, requests for more information, increased sales, responses to a survey, and e-mail enquiries (Arens, 2007).

The advertising in SL for the system was based on three approaches: person-to-person advertising, distributed advertising and presence.

#### 5.3.1 Person-to-person Advertising

Usually, advertising could be seen as a one-way process; however, people nowadays can give their feedback to advertising posts using the same channels as the sender (Arens, 2007).

Second Life has over 7 million registered users, of which over 1.5 million have logged in at some point during the last month (Educause, 2008). These figures suggested going inside
SL to communicate directly with the users who have avatars, to give an overview of the purpose of the CBR web tool and gain direct feedback from them.

The person-to-person advertising approach was performed in the form of semi-structured interviews of a random selection of Second Life users who came from different backgrounds and ages. All interviews took place within Second Life by visiting the most popular lands; therefore, the results should accurately represent the majority of SL users.

5.3.2 Distributed Advertising in Second Life

Several companies support distributed advertising networks in Second Life. The distributed network usually means that a company has partners or publishers who display advertisements on posters in SL, as shown in Figure 6.1. Many popular places can be found in Second Life, from malls to clubs. Many of these sites will place posters or stands that can distribute information, links, or objects, or provide teleports to their location (Polischuk, 2007).

The Distributed Advertising approach that was used was carried out in two phases:

1) The first phase was performed inside SL by publishing posters in the most popular lands. These posters explained the ideas of the CBR web tool in a presentable way to encourage the users to try it.

2) The second phase used the social networks connected to SL such as Facebook. These networks have defined groups for SL users to exchange ideas and information.
5.3.3 Presence in Second Life

In Second Life, to be successful, users will need to promote their presence and activity to the Second Life society through group notices, event notices, articles, and advertisements in Second Life publications or by any other suitable way (Azzara, 2007).

Some companies have found success with an ongoing presence in Second Life, driving visitors though related events such as technical talks (Intel) or concerts, for example. The key is to provide fresh content that gives residents a reason to visit and interact with the companies. Others have created places with activities to engage residents (e.g., Vodaphone and Weather Channel).

Performance of the presence approach was based on two phases:

1) The first phase was performed inside SL by developing land to serve as a small venue or place that encouraged SL residents to visit and use the CBR web tool. It is also used as a platform to communicate with SL residents for the exchange of ideas and information.

2) The second phase was performed by attending the main events and conferences held inside SL to promote and exchange ideas with the attendees there.
5.4 Feedback Services

Second Life “is a 3-D virtual world entirely built and owned by its residents” (Polischuk, 2007). In this spirit, a user feedback service has been provided within the CBR tool through which users can give their comments and suggestions for improvement.

Feedback services are provided in two sections:

1) The first section gives users the opportunity to provide their feedback about a specific case and evaluate the case solution that the CBR tool retrieves, as shown in Figure 6.2
2) The second section gives the user the opportunity to provide general feedback about the CBR web tool and any ideas or suggestions for future improvement. The results from the feedback are described in the next chapter.

Figure 5.0-3: Feedback service (snapshot of the system)

5.5 Case Studies inside SL

Case studies “typically examine the interplay of all variables to provide as complete an understanding of an event or situation as possible” (Becker et al., 2005). A series of case studies was conducted inside Second Life to establish more feedback from the users. The case studies involved semi-structured, interview-based questioning of a random selection of Second Life users. All interviews took place in Second Life.

These studies involved three stages:

1) Giving the users an overview about how the system works for them.
2) Sending the system’s link to the users and inviting them to use it.
3) Following up the case study with users after they have finished, gaining feedback by asking them specific questions. These questions have been chosen to cover all aspects of this research by clearly identifying the purpose of each question and its influence on the evaluation phase.

These case studies allowed the advertising of the CBR web tool ideas and gained direct feedback from SL users.

This continuous study has facilitated system upgrades to make it more effective in assisting SL development. The research aim was also to show how Second Life development can be improved with the use of these software techniques and methodologies. The results are described in the next chapter.
Chapter 6  

Results and Discussion

6.1 Empirical Evaluation

In regard to objective (8) of the research, this chapter discusses the evaluation of the developed CBR tool for Second Life development and the associated methodology. The chapter examines the results of using the system, analyzes feedback from users, and discusses interviews with experts in software and Second Life development.

System evaluation is the process of measuring the performance of a complete system (Gena, 2005) to discover how it is likely to perform in live market conditions. It is the process of reviewing information gathered and using it to form judgments, which in turn are used in further decision making. Close monitoring of the tool enabled the benefits of using the system to be recorded; any disadvantages or obstacles that the system may meet were also observed.

Empirical software evaluation can provide important indicators of failure in interactive systems that cannot be uncovered otherwise. Three main goals of empirical evaluation have been identified by Weibelzahl (2002):

- The first goal is to measure the system’s functionality
- The second goal is to measure the effect of the system’s interface on the user.
- The final goal is to classify specific problems with the system, and this goal could be seen as a kind of feedback loop.

One of the possible classifications of evaluation methodologies is the following by Gena (2005):

- Collection of users’ opinions. (Interviews, questionnaires).
- Observation and monitoring usage. (User observation, logging use).
- Predictive evaluation. This predicts the usability from models, specifications or early prototypes.
- Formative evaluation, by checking the first design choices and revising it.
- Experiments and tests.
Weber noted that “Empirical research is absolutely necessary for an estimation of the effectiveness, efficiency, and usability of a system that applies AI techniques in real-world scenarios. In particular, user modelling techniques that are based on human-computer interaction require empirical evaluations” (Weber, 2002).

6.1.1 Adaptive Systems

6.1.1.1 Functions and Definition of Adaptnity

Erlangung defines Adaptation as “the capacity of software systems to tailor themselves to better suit their environment, including their end users. More specifically, user-adaptive systems adapt their behaviour to individual users on the basis of processes of user model acquisition and applications that involve some form of learning, inference, or decision making” (Erlangung, 2009).

A user-adaptive system could be defined as “an interactive system that adapts its behaviour to each individual user on the basis of nontrivial inferences from information about that user” (Jameson, 2001).

The structural design of adaptive systems consists of three main components: the user model, the domain model, and the interaction model (Weibelzahl, 2002):

- The user model represents the system’s beliefs about the user.
- The domain model defines the aspects of the system and the world that are important for inferences.
- The interaction model handles the dialog between the user and the application.

6.1.2 Layered Evaluation of Adaptive Systems

The Layered Evaluation approach guarantees the success of adaptive systems by defining several steps which have to be evaluated in order to guarantee success. This evaluation is performed in layers; this means that a successful evaluation of a previous layer is act as a requirement for the next layers. Thus, three layers of evaluation of adaptive systems are outlined here, as established by Weibelzahl (2002).
Chapter 7. Conclusion and Future Works

i. During interaction, the adaptive system observes the user and registers its behaviour.

ii. Based on these input data, the user properties are inferred.

iii. Finally, the system decides what and how to adapt and present the adapted interface to the user.

By evaluating each layer the success of adaptation could be made much more likely.

6.2 Evaluation Studies with the CBR Web Tool

6.2.1 Framework Structure

The idea of the framework is to use the model of adaptive systems, as introduced by Weibelzahl (2002), to evaluate each information step on its own. Therefore, the three evaluation steps will be:

1. Evaluation of reliability and external validity of input data acquisition.
2. Evaluation of the inference mechanism and correctness of user properties.
3. Evaluation of adaptation decisions.

The evaluation studies described in this work were designed to form a complete evaluation of the CBR web tool according to the proposed framework. Thus, each study was assigned to one of the three evaluation layers.

6.2.2 Evaluation of Input Data

To build a user model, the system obtains direct or indirect input from the user. To evaluate this a check must be made whether these data are received in a reliable and valid way.

The CBR web tool takes three types of input data into account: user objectives, navigation behaviour and user’s feedback.

6.2.2.1 Methods and Criteria

Test Cases

“Reliability is determined by how stable the tool measures each time it is used under the same conditions for the same purpose” (Lauer, 2001). Measuring the same concept twice
after a while estimates the reliability, ascertained by clarifying the user satisfaction in both cases.

After applying the continuous feedback approaches provided by the CBR tool over a period of 5 weeks, 50 SL users visited the tool to find a SL home. These users were considered as group A (GA). After this period, the case base was updated with the new information. The second group B (GB), which contained 30 further users, was observed during the following 3 weeks.

In this framework, user satisfaction was defined as follows: Users are more satisfied if (a) a solution can be found with a less interaction time, and (b) if a solution is found with a minimum number of retrievals. Thus, interaction time and number of retrievals can be used as a criterion for user satisfaction. These measurements of satisfaction were used and justified in two previous cases described by Weibelzahl (2001) and Cocchi (2006) in evaluating Case-Based reasoning systems.

Thus, two measures were used for defining user satisfaction:
- Total interaction time (T).
- Number of retrievals (R).

Users using the inexperienced system (Group A, GA) should be less satisfied than those who use the experienced system (Group B, GB):
1) T is less for GB than for GA.
   \[ T \text{ (GA)} > T \text{ (GB)} \]
2) The number of retrievals (R) is less for GB than for GA.
   \[ R \text{ (GA)} > R \text{ (GB)} \]

Feedback Sections

A feedback section has been provided in which users can give their comments for improvement. From this feedback, the system can be adjusted according to the users’ demands. By performing these adjustments, the system has become increasingly useful for users who wish to access items and objects within SL.
Chapter 7. Conclusion and Future Works

This section asks the users specific questions about the idea of the system and the system itself, and it gives users the chance to provide general feedback, ideas or suggestions about the system.

6.2.2.2 Results

Most users clarified their need for help in developing their lands in Second Life (Table 4). On average, each user selected 2 objectives (Table 6.1).

Table 6-1: The table explains the frequency and percentage of objectives selected by users.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.1 I need some help in developing my land in Second Life.</td>
<td>410</td>
<td>40.2%</td>
</tr>
<tr>
<td>No.2 I want to know the kinds of objects that suit my land.</td>
<td>330</td>
<td>32.3%</td>
</tr>
<tr>
<td>No.3 I would like people to be able to view my objects easily.</td>
<td>50</td>
<td>4.9%</td>
</tr>
<tr>
<td>No.4 I want my SL land to look interesting and new.</td>
<td>110</td>
<td>10.8%</td>
</tr>
<tr>
<td>No.5 I want to locate a particular object to add it to my land.</td>
<td>65</td>
<td>6.4%</td>
</tr>
<tr>
<td>No.6 I just want to take a look on the web tool.</td>
<td>45</td>
<td>4.4%</td>
</tr>
<tr>
<td>No.7 I want to discover what SL is.</td>
<td>10</td>
<td>1.0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1020</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

Table 6-2: The table shows the rate of each objective was selected by users.

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>117</td>
</tr>
<tr>
<td>2</td>
<td>324</td>
</tr>
<tr>
<td>3</td>
<td>47</td>
</tr>
<tr>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>&gt; 5</td>
<td>0</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>2</strong></td>
</tr>
</tbody>
</table>

Feedback Sections

Two hundred responses were obtained from different users of the system. These responses have been analyzed in this section.
Table 6-3: User feedback

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you think this system is useful?</td>
<td>79% stated that the system is useful.</td>
</tr>
<tr>
<td>Do you consider that using previous solutions and learning from them is helpful for you?</td>
<td>55.6% stated that they didn’t know if it helps or not.</td>
</tr>
<tr>
<td>Do you think modelling helps in developing the lands in SL?</td>
<td>50.3% stated that they didn’t know if modelling helps in developing within SL.</td>
</tr>
</tbody>
</table>

The responses that came from the general feedback implied that the majority of the users believe that the system can be useful, but they also showed that the idea of applying software modelling in SL is not understood.

Responses showed that most of the users within Second Life were not familiar with how to use the built-in Second Life programming language that is available to construct new objects in the virtual world. Thus, the users preferred to use existing ready objects rather than having to create their own.

Test Cases

Based on the framework discussed earlier, inexperienced users of Group A would be expected to need more time to reach the desired outcomes. In order to test and analyze the results, descriptive statistics tools were employed, based on data collected from the system. The total number of observations was 80, of which 50 were from Group A and 30 from Group B. The results, as presented in table 6.4, coincides with expectation with the average time to find a satisfactory result for Group A being 640 seconds, which is higher than the 560 average of Group B. Further, the standard deviation of group A is higher than standard deviation of group B, which indicates that the variation in group B is less than variations in group A. Such results support the argument and suggest that the efficiency in finding the desired object in Group B is higher than in Group A, but this on its own does not provide sufficient evidence to conclude that average (efficiency) of group A is significantly greater (less) than Group B. One
Way Analysis of Variance (ANOVA), as inferential statistical tool, was therefore employed to investigate whether the average differences between the two groups is significant or not. The confidence level assigned in the study is 95%. The decision rule states that if the statistics’ outcome is significant at confidence level 95% or more then, the differences could be considered as significant. Thus, such difference could be treated as sufficient evidence to accept that the gap between the groups is a significant one. Results, as presented in Table 6.5, show that the difference between the two groups is significant. The computed F test value was 84.002 and is valid at a confidence level higher than 99%.

**Table 6-4:** Main results of the comparison between the groups  
Efficiency based on Total duration $T(s)$

<table>
<thead>
<tr>
<th>Group</th>
<th>Average of Total duration $T(s)$</th>
<th>Standard Deviation</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>640</td>
<td>38.4</td>
<td>50</td>
</tr>
<tr>
<td>B</td>
<td>560</td>
<td>36.8</td>
<td>30</td>
</tr>
</tbody>
</table>

**Table 6-5:** Statistical analysis of differences in efficiency between groups.  
This table analyzes the mean differences between groups presented in Table 6.4 based on ANOVA (Analysis of Variance), an inferential statistical tool.

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>120000.000</td>
<td>1</td>
<td>120000.000</td>
<td>84.022</td>
<td>.000</td>
</tr>
<tr>
<td>Within Groups</td>
<td>111400.000</td>
<td>78</td>
<td>1428.205</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>231400.000</td>
<td>79</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Test Cases**

Furthermore, the inexperienced users of Group A would be expected to need a greater number of retrievals to reach the desired outcomes. In order to test and analyze the results, descriptive statistics tools were used on the data collected from the system. The results, as presented in Table 6.6, coincides with this expectation, with the average number of retrievals for Group A being 3.86, which is higher than the average of 3.30 for Group B. Furthermore, the standard deviation of group A is higher than the standard deviation of group B which
indicates that the variation in group B is less than the variation in group A. Such results support the argument and suggest that the efficiency in the retrieval process for Group B is higher than Group A. The ANOVA inferential statistical tool was employed to investigate whether the average differences between the two groups is significant or not. The confidence level assigned in the study was again 95%. The results, as presented in Table 6.7, show that the difference between the two groups is significant. The computed F test value is 16.2 and it is valid at a confidence level higher than 99%. Based on the above, the author concludes that the differences are significant and it provides sufficient evidence to conclude that the efficiency of retrieval of group B is higher than the efficiency of group A.

Table 6.6: Main results of the comparison between the groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Average Number of Retrievals</th>
<th>Standard Deviation</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3.86</td>
<td>0.64</td>
<td>50</td>
</tr>
<tr>
<td>B</td>
<td>3.3</td>
<td>0.53</td>
<td>30</td>
</tr>
</tbody>
</table>

Table 6.7: Statistical analysis of differences in efficiency of retrieval between groups.
This table analyzes the mean differences between groups presented in Table 6.6 based on the ANOVA inferential statistical tool.

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>5.880</td>
<td>1</td>
<td>5.880</td>
<td>16.195</td>
<td>.000</td>
</tr>
<tr>
<td>Within Groups</td>
<td>28.320</td>
<td>78</td>
<td>.363</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>34.200</td>
<td>79</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6.2.3 Evaluation of Inference

The second study compares the assumptions the CBR web tool makes about which cases are good or bad cases with the actual opinion of the users. This study was aimed to verify
the properties that are stored in the user model. A perfect user model is fully congruent with reality, which means that when the properties are specified by the user, the retrieved object that matches those properties does, in fact, match the user’s needs.

This test compared the system output of suggested objects retrieved from the database with the success of the object cases retrieved in matching their requirements as reported by the users themselves.

6.2.3.1 Methods and Criteria

This test was conducted by inviting 150 Second Life users from different backgrounds to use different categories of the system between December 2009 and April 2010; then the case solution retrieved would be evaluated. Two results could be produced:

1) If the result was successful, the case was retained and saved in the database as a new case in order to learn from the success. The solution would then be assumed to be congruent with reality and user recommendations.

2) If the results were unsuccessful, then the case base would be adjusted to improve the results returned by the matching process. The solution would be assumed to be incongruent with user recommendations.

After the test, the users were asked to immediately take part in a questionnaire. This questionnaire contained only three direct questions that summarized the success/failure of their experience with the web tool and their reviews for the given case solution. These questions were:

1. Do you think this case suits your requirements?
2. Did you find your desired object here?
3. Do you think the system functionality works fine the way it currently is?

6.2.3.2 Results

It was found that most assumptions were congruent with test performance (see Figure 6.1). 122 users indicated that the case solution retrieved for their enquiries met their requirements. However, the researchers identified 28 incongruencies; i.e., in 28 cases, the
system’s assumptions about the solution of a problem differed from the actual recommendations by the SL users.

![Figure 6-1: Frequencies of congruence and incongruence cases, grouped by system categories.](image)

These incongruencies occurred in four categories: Art, Building, Scripts and Animations (see Figure 6.1). For all four categories, it is shown that the web tool did not measure the same kind of information as the user wanted. Obviously, a disparity existed between the declarative understanding (as measured by the web tool) and the actual performance in real-world settings.

Next, the users completed the study questionnaire; 150 responses were obtained on different cases of the system from the 150 Second Life users. These responses have been analyzed as follows:

<table>
<thead>
<tr>
<th>Question</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you think this case suits your requirements?</td>
<td>81%</td>
</tr>
<tr>
<td>Did you find your desired object here?</td>
<td>72.7%</td>
</tr>
<tr>
<td>Do you think the system functionality works fine the way it currently is?</td>
<td>86.6%</td>
</tr>
</tbody>
</table>
Twenty-eight responses out of 150 said that the solution case did not suit their requirements. As expected, this figure was equal to the incongruent cases found above. In these cases, the descriptor attributes for some objects will be adjusted so that future similar object searches will give more satisfactory results.

The difference between the percentage results for the first and second questions leads to the conclusion that even if the case is considered a good case, it does not always mean that it will give the users the object they desire. This information leads to the conclusion that case adjustment is not only needed for the bad cases; some of the good cases may also need adjustment for better results. It also indicates that the system needs more objects to be added to the database.

The studies above evaluated the inference of user properties, and it can be concluded that the assumptions made about good cases and cases needing adjustment are generally correct. Assuring an accurate user model is a requirement for the further adaptation process.

### 6.2.4 Evaluation of Adaptation Decisions

Given that the user model is accurate, as shown in the last section, different adaptation decisions are feasible. In principle, a wide range of diverse decisions may be applied. However, this study focuses on the method of dynamic weighting used for adaptation by the SL web tool.

The dynamic weights can change the relevance of the search parameters, tuning the search result to become more similar to the users’ needs (de Hugo and Hoeschl, 2003). Thus, for the SL tool, the similarity method was modified so that each descriptor was given a weight; the system acted dynamically to change the weight used.

Dynamic weighting was performed in many phases, one of which was to apply the priority feature of the web tool. The findings demonstrated that it is useful to allocate priorities to each descriptor so the user can alter the priorities to make the retrieval of matching objects closer to what was desired. Priorities were allocated to the four descriptors in the new case. These attributes are given weights according to the priority chosen for each descriptor which, it was assumed, would make the retrieval of matching objects closer to what was desired.
Chapter 7. Conclusion and Future Works

To help estimate the effect that stems from the adaptation, this study demonstrated how users behave with or without the priority feature.

6.2.4.1 Methods and Criteria

A total of 200 users who accessed the web tool were studied and their interactions with the CBR system were analyzed. Two groups were identified: The first group (G1) “first 100 users” decided to use the priority feature provided by the web tool, but the second group (G2)” the 1st 100 users” ignored the priority feature and completed the steps as usual.

A user rating system has been used here: All users give their rating as a percentage of their satisfaction with the quality of service with their feedback at the end of the process. Such a tool would assess the customers’ overall satisfaction with 100% showing total satisfaction and 0% showing the users were completely dissatisfied.

Thus, two statistical hypotheses were tested:

1. Users in G1 should, on average, be more satisfied with the interaction than users in G2:
   
   \[ T (G1) < T (G2) \]
   \[ R (G1) < R (G2) \]

   Where \( T = \) Total interaction time, \( R = \) Number of retrievals.

2. User satisfaction as considered by the user’s rating should be higher in the first group than the second:

   \[ \text{RATE (G1)} > \text{RATE (G2)} \]

6.2.4.2 Results

First, users were asked to rate their experience with Second Life and the Internet in general. Table 6.9 shows the distributions of these ratings. These data were collected to validate that participants had a good experience within the SL environment. Table 6.9 shows that participants were generally satisfactorily familiar with using Second Life.
Table 6-9: Self-rating Second Life and Internet Virtual Environments experience

<table>
<thead>
<tr>
<th></th>
<th>The Internet</th>
<th>Second Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>None</td>
<td>3</td>
</tr>
<tr>
<td>Casually</td>
<td>10</td>
<td>53</td>
</tr>
<tr>
<td>Several times a week</td>
<td>87</td>
<td>128</td>
</tr>
<tr>
<td>Daily</td>
<td>103</td>
<td>72</td>
</tr>
</tbody>
</table>

Then, the users’ ratings showed that the first group satisfaction was higher (see Figure 6.3). The second group, who interacted with a completely non-adaptive system (without using the priority feature), rated the success lower (see Figure 6.2).

![Figure 6-2: Distribution of System rating percentages given by the users. Rating percentages shown in x-axis.](image1)

![Figure 6-3: Average of System rating percentage given by users per group](image2)
Users of Group 1 who used the adaptation feature were expected to be more satisfied. In order to test and analyze results descriptive statistics tools were employed based on data collected from the system. The total number of observations was 200, of which 100 were for group 1 and 100 from Group 2. The results, as presented in table 6.10, coincides with the expectation, with the average time taken for Group 1 being 450 seconds which is lower than the average of 540 seconds for Group B. On the other hand, standard deviation of group 1 was more than the standard deviation of group 2, indicating the variation in group 2 was less than the variation in group 1. Such results are mixed. As a potential explanation, mixed results may be due to the fact that group 1 utilizes more features according to their needs, thus there were more variation in this group compared to the other group. In order to have a sufficient evidence about the descriptive results, ANOVA, the inferential statistical tool, was employed to investigate whether the average differences between the two groups is significant or not. The confidence level assigned in the study is 95%. The results, as presented in Table 6.11, show that the difference between the two groups is significant. The computed F test value was 252.5 which is valid at confidence level higher than 99%. Based on the above, the author concludes that the differences are significant and this provides sufficient evidence to conclude that the efficiency of group 1 is significantly higher than the efficiency of group 2.

<table>
<thead>
<tr>
<th>Group</th>
<th>Average of Total duration $T$(s)</th>
<th>Standard Deviation</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>450</td>
<td>42.7</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>540</td>
<td>37.2</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 6-10: Main results of the comparison between the groups (With/ without using features) Efficiency based on Total duration $T$(s)

Table 6-11: Statistical analysis of differences in efficiency between groups. This table analyzes the mean differences between groups as it's presented in Table 6.10 based on ANOVA results.
Chapter 7. Conclusion and Future Works

### ANOVA

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>405000.000</td>
<td>1</td>
<td>405000.000</td>
<td>252.487</td>
<td>.000</td>
</tr>
<tr>
<td>Within Groups</td>
<td>317600.000</td>
<td>198</td>
<td>1604.040</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>722600.000</td>
<td>199</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Furthermore, based on the framework discussed earlier, users of Group 1 who utilized the priority feature would be expected to need less retrieval to reach the desired outcomes. The results as presented in Table 6.12 coincide with the expectation, with the average number of retrievals for Group 1 being 2.75 which is lower than average of 3.20 for Group 2. The results presented in Table 6.13 show that the difference between the two groups is significant. The computed F test value was 24.8 and this is valid at confidence level higher than 99%. Based on the above, the author concludes that the differences are significant and this provides sufficient evidence to conclude that efficiency of group 1 is significantly higher than the efficiency of group 2. This shows that the use of adaptation feature was of value for the users and helped to enhance their efficiency by reducing number of retrievals needed to reach their desired outcome.

**Table 6-12**: Main results of the comparison between the groups (With/ without using features)

<table>
<thead>
<tr>
<th>Group</th>
<th>Average Number of Retrievals</th>
<th>Standard Deviation</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.75</td>
<td>0.70</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>3.20</td>
<td>0.57</td>
<td>100</td>
</tr>
</tbody>
</table>

**Table 6-13**: Statistical analysis of differences in efficiency between groups.

This table analyzes the mean differences between groups as presented in Table 6.12 based on ANOVA results.
Chapter 7. Conclusion and Future Works

<table>
<thead>
<tr>
<th>ANOVA</th>
<th>Number of Retrievals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sum of Squares</td>
</tr>
<tr>
<td>Between Groups</td>
<td>10.125</td>
</tr>
<tr>
<td>Within Groups</td>
<td>80.750</td>
</tr>
<tr>
<td>Total</td>
<td>90.875</td>
</tr>
</tbody>
</table>

It was also expected that users of Group 1 who utilized the priority feature would be expected to give a higher satisfaction rating for the system. The results as presented in Table 6.14 coincides with the expectation, with the average for Group 1 being 87.6% which is higher than average of 77.8% for Group 2. Furthermore, the standard deviation of Group 1 is less than the standard deviation of Group 2 which indicates that the variation in group 1 is less than the variation in group 2. Such results coincide with each other. The results as presented in Table 6.15 show that the difference between the two groups is significant. The computed F test value is 163.4 and this is valid at a confidence level higher than 99%. Based on the above, the author concludes that the differences are significant and it provides sufficient evidence to conclude that the satisfaction rating of Group 1 is significantly higher than the rating of Group 2. Both groups were happy about the system but there was a higher rating for Group 1. This proves the use of adaptation feature was of value for users and helps to enhance their satisfaction. The difference in user satisfaction measures can characterise the performance of the system. It is promising that users in Group 1 were presented with better results than users in Group 2. This finding suggests that using the adaptation decisions to further increase the effectiveness and efficiency of the CBR web tool will benefit future users and may, therefore, even further increase the users’ satisfaction.

Table 6-14: Main results of the comparison between the groups (With/without using features) Based on Rating.

<table>
<thead>
<tr>
<th>Group</th>
<th>Average of Rating</th>
<th>Standard Deviation Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>87.6</td>
<td>5.1</td>
</tr>
<tr>
<td>2</td>
<td>77.8</td>
<td>5.8</td>
</tr>
</tbody>
</table>

Table 6-15: Statistical analysis of differences in efficiency between groups.
Chapter 7. Conclusion and Future Works

This table analyze the mean differences between groups presented in Table 6.14 based on ANOVA.

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>4860.980</td>
<td>1</td>
<td>4860.980</td>
<td>163.449</td>
<td>.000</td>
</tr>
<tr>
<td>Within Groups</td>
<td>5888.540</td>
<td>198</td>
<td>29.740</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10749.520</td>
<td>199</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Finally, figure (6.4) shows the total number of users used the CBR web-based system from August, 2009 to August 2010. This figure shows that the number of users has grown rapidly from less than a hundred at the beginning to near a thousand users at the moment and the growth still continues. Furthermore, the results of this test showed that the usage of the system was notably increased after Feb, 2010 due to the advertising approaches implemented, at that time, which encouraged more users to use and interact with the system.

![Figure 6-4: total number of users used the CBR system from August, 2009 to August 2010](image)

6.2.5 Conclusions

The evaluation studies explained in this work were designed to form a complete evaluation of the CBR web tool according to the proposed framework. Therefore, each study was assigned to one of the three evaluation layers.
Chapter 7. Conclusion and Future Works

The input data were evaluated by estimating the reliability, which was done by clarifying the user satisfaction in test cases. It was shown that, with a little additional experience, users are able to change the way the system works. SL users seem to welcome the opportunity to describe their goals and objectives. Despite the fact that some people refused to answer these questions, most users were more satisfied when they had this opportunity.

The inference mechanism was evaluated by comparing the assumption of the CBR web tool with the actual experience of the users. The congruence of these measurements was very high, although a few incongruencies were uncovered.

The adaptation decision was evaluated to estimate the effect that stems from the adaptation. It was shown from the results that adapting to user recommendations saves time for the users and makes them more satisfied. It was noted that the adaptivity has an important impact on the system performance and the results given.

In summary, this project provides strong evidence that case-based learning systems can considerably improve the development of virtual world environments and that feedback from users can further improve the effectiveness of a case-based reasoning tool.
Chapter 7  Conclusion and Future Works

7.1 Conclusion

After thoroughly researching Second Life environment a distinct lack of software methodologies used in the development and implementation of lands and objects in SL has been noted. Following an intense study of different software engineering methods and techniques in the literature review chapter, a full understanding of the topics and how they operate was developed. A strong base was built regarding each respective topic. Moreover, a concerted study of Case-based Reasoning and its process cycle revealed it to be the most appropriate technique to use with SL.

The creation of experimental Second Life platforms was described in Chapter 3, from those experiments inside the second life environment all the necessities required to build and develop lands within the virtual world have been outlined and understood. In addition to that, interviews were conducted inside Second Life to establish whether any of the major companies involved applied recognised software methodologies in developing their own lands. After conducting the studies inside SL, it was apparent that only one company, IBM, used software methodologies within SL. The system that they used to build their islands in Second Life was simple use cases. However, the majority of companies still think that modelling could help in developing lands inside the Second Life environment.

Interaction with many Second Life users took place as part of this research and, from their feedback, the conclusion was reached that they required a method by which to build their lands in SL without the need to possess specific skills. Not only that, but the majority of the new users wanted a method that allowed them to use previously created buildings and lands and directly copy or edit them for use. Those findings further emphasized the advantages of using the CBR software technique.

This was further described in Chapter 3 in which the applicability of CBR in SL was defined and highlighted. This match was determined because the processes involved are all
primarily related to the Second Life methods, and no major unnecessary steps are involved to complete the process. Furthermore, after identifying the synergies between both CBR and SL, it was acknowledged that CBR was the method that most resembled the development methods commonly used within Second Life. Those findings further emphasized the advantages of using the CBR software technique. From this information, a system that supports SL development using CBR was created.

The building of a Case-Based Reasoning web-based system was described in Chapter 4 to determine if practical benefits can be obtained from such a system to assist in Second Life development. The system described was created in the form of a web-based system, as the web-based technology was viewed to be the best environment to be used when joining SL and CBR. In creating the system, the researcher came across several equations that used the weights of the keywords that the users typed in to find the best possible match from previously stored cases. After trying all the candidate equations, the most appropriate one was chosen and adjusted with a method of dynamic weighting for maximum accuracy. Different keywords and data entry were tried manually, and it was shown that using the system with the adjusted equation worked perfectly well. Furthermore, the interactive nature of SL development and the tool developed enabled some of the steps in the CBR system to be adapted to make it even more applicable to SL.

The mechanical phases of the CBR web-based system were explained in detail in Chapter 4 including the data retrieval process, matching function, dynamic weighting system and adaptation phase, which the system uses to find the best matching solution. In addition, a systematic methodology for Second Life development was introduced in Chapter 4 which explains the steps the users will go through until they find a solution. However, the first version of the web tool was satisfactory as a proof of concept, but not as a generally useful system for Second Life. Collecting and analyzing the feedback for the first version identified the adjustments and improvements needed. Therefore, a number of changes have been implemented to address these problems and make the tool more practical. In addition, new functionalities, described in Chapter 4, have been added in the improved version to refine and develop it as a highly effective SL development tool.

In order to enhance the CBR tool and the Second Life development methodology, a continuous feedback approach was proposed to make use of Second Life users’ feedback which allows improvements to be made to and adjusted according to the users’ demands. The
mechanisms for the continuous feedback described in Chapter 5 were based on four approaches: dynamic weighting approach, advertising platforms inside SL, feedback services, and case studies.

Various studies were designed and explained in Chapter 6 to form a complete evaluation of the CBR web-based system and the associated methodology according to the proposed framework in order to examine the results of using the system, analyze feedback from users, and discuss interviews with experts in software and Second Life development. The Layered Evaluation approach was used in which each layer has to be evaluated to guarantee adaptation success. Thus, each study was assigned to one of the three evaluation layers and the results described in Chapter 6 provides strong evidence that case-based systems can considerably improve virtual world environments.

This research has shown that Second Life development can be improved with the use of software techniques and methodologies. CBR techniques have been found to be particularly appropriate for this purpose. Furthermore, future developments in this research project will apply the users’ feedback with the aim to make it yet more effective in assisting SL development.

7.2 Future Works

This thesis describes the development of a methodology for developing artefacts within virtual environments. This first step is the creation of a tool for SL developers that would be capable of generating feedback from the users on its success in retrieving desired objects from the SL environment that matched their needs. Although some feedback has been obtained and improvements made as a result, from this feedback, further improvements that can be made to the system will be identified. The system can then be adjusted according to the users’ demands, which will facilitate its use and obtain results that are more closely related to the users’ needs.

For future development, from the use of the new, continuous feedback approaches, it will be possible to increase the validity and reliability of the system by constantly tracking its progress. Long term testing should be done to find new ways to encourage users of Second Life to contribute to the system and its database. The close monitoring of the tool will increase the benefits of using the system and such benefits will be recorded. Any disadvantages or
obstacles that may encounter will also be observed. These observations should enable it to be refined and developed to become a highly effective SL development tool.

Furthermore, there are many interesting issues for future work. More research in this direction could be done in order to find the applicability of the methodology and tool proposed to corporate users of SL rather than individuals; this can be done by identifying the differences between the two types of developers to see if different version of either the tool or the database would be needed to match these different needs.

It would be useful to extend the use of the technique and research its applicability to other virtual world environments. Although it is expected that development methods in these other worlds is likely to be similar to that of SL, this cannot be assumed without the necessary research first. Finally, it is possible that the techniques used in this research could be used in online environments other than that of virtual worlds. For example, the growing popularity of web “apps” may also benefit from a CBR tool for users to find and then perhaps modify the apps to suit their needs.

7.3 The Success of the Research

Through a methodological and thorough review of the literature and analyzing the outcome of the experiments done, this thesis has systematically quantified and characterized some of the unique attributes of virtual worlds (specifically Second Life) under different categories and identified its need of systematic methodologies for the development purpose.

Furthermore, the thesis emphasized the use of Case-Based Reasoning (CBR) for Second Life development by examining its process cycle and clarifying and identifying the synergies between Case-Based Reasoning techniques and Second Life systems. From this contribution, a CBR web-based system that supported SL development with CBR was provided with a systematic methodology for building within the virtual world. In addition, a unique equation with a method dynamic weighting system was developed and a continuous feedback approaches were provided and used in the web system which allowed improvements to be made to the results and adjusted according to the users’ demands. The success of this tool is published in a paper by the author (Shubati, Dawson and Dawson, 2010), and the features described
should make a significant contribution to the use of web-based CBR systems and web applications in general.

The main contribution of this thesis is to prove that Second Life can benefit from the application of a software methodology, and that Case-Based Reasoning (CBR) is an appropriate technique for such an application. This research has shown that Second Life development can be improved with the use of software techniques and methodologies and CBR techniques have been found to be particularly appropriate for this purpose, leading to three papers (Shubati, Dawson, and Dawson, 2009; Shubati, Dawson, and Dawson, 2010a; Shubati, A., Dawson, R.J. and Dawson 2010b) so far.

This thesis has made significant contribution to virtual world development. It is the first reported research to explore the use of software techniques within these virtual environments and the first to examine the relationship between the common software development techniques and the commonly used development methods in Second Life. Finally, this research has provided a useful framework and built a foundation for future research efforts on this subject.
References

- Brashears, Meadows, Ondrejka, and Soo. (2003 )inden Scripting Language Guide’, Linden Lab,
References

References

References


- Salo, L. (2007) Academic Dissertation, the Faculty of Science, University of Oulu, on January 12th, 2007,

- Salomon, Mandy. (2007) ‘Senior Researcher, Faculty of Life and Social Sciences’, Smart Internet Technology CRC, Swinburne University of Technology, May 2007


References


- Yue, Yong et al. (2002) “Study of neural network techniques for computer integrated manufacturing”; Engineering Computations; MCP UP Limited; Vol. 19, No.2; p.140
Appendices

Appendix A
IBM Business centre Interview Summary:

[6:53] DBMc Smalls: hi, Ahmad
[6:53] You: I am doing a research about second life and IBM lands here
[6:53] DBMc Smalls: OK
[6:54] You: im from Loughborough university
[6:54] You: I want to ask if IBM used any modeling languages in developing here land here?
[6:55] DBMc Smalls: do you mean the structures and features, or just the land itself?
[6:55] DBMc Smalls: there was some basic use case development done
[6:56] DBMc Smalls: but Second Life building is pretty efficient, and the intermediate step of UML didn’t really seem to create any intrinsic efficiencies
[6:57] DBMc Smalls: so, we didn’t use UML -- use cases first, applied some virtual worlds development methodology, then "straight into" SL building
[6:58] DBMc Smalls: a lot of study on how to build the SL infrastructure so that the VBC was manageable over the long run
[6:59] You: so u doesn’t think that modelling helps in developing the lands here?
[6:59] DBMc Smalls: we assessed, then chose not to go there
[7:00] DBMc Smalls: some of that assessment, granted, was based on prior experience with building and running SL experiences
[5:28] Ahmad Flores: u tell me that applied some virtual worlds development methodology, then "straight into" SL building
[5:29] DBMc Smalls: correct
[5:29] Ahmad Flores: what u mean here in virtual worlds development methodology?
[5:29] DBMc Smalls: basically, I mean defining the interaction model first
[5:30] DBMc Smalls: in a loose sense, it’s like defining the set of use cases for someone entering the VW
[5:31] DBMc Smalls: so, when someone arrives at the "arrival point", what do they need to know for doing whatever they can do next
[5:32] DBMc Smalls: those objects and their behaviors have to be defined
[5:33] DBMc Smalls: and that is true for any key place in the entire VW that you are building
[7:00] You: can I take your email if I need any information later?
[7:00] DBMc Smalls: sure: dbmc@us.ibm.com
[7:00] You: thank u
[7:01] DBMc Smalls: you’re welcome -- feel free to explore, and enjoy your visit at the IBM Business Center

Sun Microsystems Interview Summary:

[6:02] You: hi
[6:02] You: u work for sun right?
[6:03] Christopher Carter: yes
[6:03] You: so i want to ask if sun use any modelling languages in developing here land here?
[6:03] Christopher Carter: no, we use Maya on the outside and then import that design into SL
[6:03] Christopher Carter: but we are moving away from that
[6:04] Christopher Carter: this build was created in Maya
[6:04] Christopher Carter: then a script imported it
[6:04] Christopher Carter: Maya it is a graphic program
[6:05] You: sun didn’t do any modelling before development
[6:05] You: like UML?
[6:05] Christopher Carter: no
[6:05] Christopher Carter: no need
[6:05] You: u think there is no need for modelling in SL?
Appendices

[6:06] Christopher Carter: did not say that, no need for us doing a build, but as for UML, no, for a sim build, it would be a waste of time
[6:06] Christopher Carter: it is old school
[6:07] Christopher Carter: why would i waste My time doing a UML to do that
[6:07] Christopher Carter: alot of the old structures are going to fade away
[6:07] Christopher Carter: but that is just My opinion
[6:08] Christopher Carter: in here it is about content
[6:10] Christopher Carter: would not work
[6:11] Christopher Carter: it is technology that would be more waste then benefit
[6:13] You: so how u know what ur profit from the land?
[6:13] Christopher Carter: money?
[6:13] Christopher Carter: can not be measured
[6:14] Christopher Carter: is about community
[6:14] Christopher Carter: right now it can not be measured becuase everything is still too knew
[6:14] Christopher Carter: you are asking about the ROI
[6:15] Christopher Carter: it is a corporate means of measuring the "profit" on an investment
[6:16] Christopher Carter: and sometimes
[6:16] Christopher Carter: you just can not do that
[6:16] Christopher Carter: not everything is in a retail set of flow
[6:16] You: u do it here?
[6:16] Christopher Carter: yes
[6:16] Christopher Carter: and for right now
[6:16] Christopher Carter: you can not measure profit, because there is none, dollar wise
[6:16] Christopher Carter: but
[6:17] Christopher Carter: we have made sales through here
[6:17] Christopher Carter: but do not need waste time constructing a model
[6:17] Christopher Carter: because
[6:17] Christopher Carter: the environment is always in flux
[6:17] Christopher Carter: like the web
[6:17] Christopher Carter: there is not always "profit" there
[6:18] Christopher Carter: but yet companies can sometimes spend millions on it
[6:18] Christopher Carter: same principle
[6:19] You: u think no company use UML in SL yet?
[6:19] Christopher Carter: it is a dead language
[6:20] Christopher Carter: and I worked for some major corporations
[6:20] Christopher Carter: and in environments that would use it
[6:20] Christopher Carter: no offense
[6:20] Christopher Carter: just My observations
[6:21] Christopher Carter: none
[6:21] Christopher Carter: they use roi's
[6:21] Christopher Carter: there are a few formula's they use
[6:26] You: u tell me there is no need for modeling?
[6:26] Christopher Carter: yes
[6:26] You: or drawing a diagrams?
[6:27] Christopher Carter: I agree

Summary of Interviews done with SL users

[2:54] Ahmad Flores: don’t u get distracted by the surrounding, your avatars, and also strangers (avatars) around you?
[2:54] arming Finl: no
[2:55] Ahmad Flores: How did u choose your Avatar?
[2:55] arming Finl: just a friend give me
[2:56] Ahmad Flores: Does it resembles your RL you?)
[2:56] arming Finl: no
[2:56] Ahmad Flores: Do you have another Avatar?
[2:57] arming Finl: so what's going on.why did u ask me so many thing?
[2:57] Ahmad Flores: sorry but im doing a research about sl for a university in england,,
[2:58] arming Finl: k i see
[2:58] Ahmad Flores: so what purpose for the research
[2:59] Ahmad Flores: its about ppl inside sl and what they think about it
[2:59] Ahmad Flores: only 3 or 4 questions left:)
[2:59] arming Finl: k i see.
[3:00] Ahmad Flores: so Do you have another Avatar?
[3:00] arming Finl: no
[3:00] Ahmad Flores: Where do you normally go each time you log in?
[3:01] arming Finl: i almost at camping site
[3:02] Ahmad Flores: Do you change your Avatar every now and then?
[3:02] arming Finl: no
[3:02] Ahmad Flores: 9- Tell me something you experienced or learned in SL then later tried it or adopt it in RL
[3:03] arming Finl: i don't mixed up SL with RL
[3:04] Ahmad Flores: 10- Do you think your computer limits your experience in SL?
[3:04] arming Finl: yes
[3:04] Ahmad Flores: How?
[3:04] Ahmad Flores: is it easy to navigate?
[3:05] arming Finl: yes
[3:05] Ahmad Flores: 11- What do you think of the technology of SL?
[3:06] arming Finl: it is amazing
[3:06] Ahmad Flores: is it easy to navigate?
[3:06] arming Finl: yes
[3:06] Ahmad Flores: Easy to do things? Personalise settings etc
[3:06] arming Finl: yes. it is user friendly i think
[3:07] Ahmad Flores: 12- Do the details of the place (the design) affects your experience?
[3:07] arming Finl: yes
[3:07] Ahmad Flores: in what ways??
[3:08] arming Finl: so many place had camping limitation
[3:08] Ahmad Flores: 13- Does being surrounded by others enhance or hinder your experience inworld?
[3:09] arming Finl: no
[3:09] Ahmad Flores: 14- One last Q! What do you take home with you from SL?
[3:10] arming Finl: i am homeless at SL
[3:11] Ahmad Flores: no i mean what u learn from sl ?
[3:12] arming Finl: i think it let my english skill improve

[2:36] Rosalia Supermarine: yes tell me
[2:37] Ahmad Flores: How many times you visit SL per week?
[2:37] Rosalia Supermarine: all days
[2:37] Ahmad Flores: 2- How long each log in lasts?
[2:38] Rosalia Supermarine: 6 hours
[2:38] Ahmad Flores: 2- How long each log in lasts?
[2:39] Rosalia Supermarine: who is the commitent for this research?
[2:38] Ahmad Flores: a university in england
[2:38] Ahmad Flores: so What do you enjoy the most in SL?
[2:39] Rosalia Supermarine: since 3 weeks
[2:39] Rosalia Supermarine: as if I logged first time in february
[2:39] Rosalia Supermarine: an I notice that
[2:39] Rosalia Supermarine: sex zone r the most populated
[2:41] Rosalia Supermarine: sex is nice is fynny
[2:41] Rosalia Supermarine: have clothes free too
[2:42] Rosalia Supermarine: and comunicate with all the world
[2:42] Ahmad Flores: How did u choose your Avatar?
[2:44] Ahmad Flores: r u still here?
[2:44] Rosalia Supermarine: yes sorry
[2:44] Rosalia Supermarine: don’t know
[2:45] Rosalia Supermarine: how i choose my avatar
[2:45] Rosalia Supermarine: i found it in a freee shop
[2:45] Ahmad Flores: 5- Does it resembles your RL you?:)
[2:46] Rosalia Supermarine: no
[2:47] Ahmad Flores: 6- Do you have another Avatar?
[2:50] Rosalia Supermarine: no
[2:50] Ahmad Flores: 7- Where do you normally go each time you log in?
[2:51] Rosalia Supermarine: where I was last time
[2:52] Ahmad Flores: no i mean usually where u go?
[2:52] Rosalia Supermarine: at money island
[2:53] Ahmad Flores: 8- Do you change your Avatar every now and then?
[2:56] Rosalia Supermarine: clothes hair
[2:56] Rosalia Supermarine: shoes
[2:58] Ahmad Flores: why u change it?
[3:01] Rosalia Supermarine: I'm a female
[3:01] Rosalia Supermarine: :) 
[3:01] Rosalia Supermarine: is nice chenging clothes always
[3:02] Ahmad Flores: ofcours:)
[3:02] Ahmad Flores: 9- Tell me something you experienced or learned in SL then later tried it or adopt it in RL
[3:04] Rosalia Supermarine: nothing
[3:04] Ahmad Flores: Do you think your computer limits your experience in SL?
[3:05] Rosalia Supermarine: no
[3:05] Ahmad Flores: What do you think of the technology of SL?
[3:08] Ahmad Flores: still here:)?
[3:09] Rosalia Supermarine: yes sorry
[3:10] Rosalia Supermarine: in RL I'm at work
[3:10] Rosalia Supermarine: I think is a grat technology
[3:10] Rosalia Supermarine: great
[3:10] Ahmad Flores: Do the details of the place (the design) affects your experience?
[3:11] Rosalia Supermarine: sorr i haven’t understood
[3:12] Ahmad Flores: i mean does the details in the places inside sl like the design affect u?
[3:15] Rosalia Supermarine: seems to be real sometimes
[3:15] Ahmad Flores: Does being surrounded by others enhance or hinder your experience inworld?
[3:19] Rosalia Supermarine: sorry now I've to log out
Appendices

[3:34] Ahmad Flores: hi
[3:34] Ahmad Flores: an i ask u some general questions about sl for my research?
[3:35] Ahmad Flores: can*
[3:35] Zussa Ryba: hi
[3:35] Zussa Ryba: ok
[3:35] Ahmad Flores: thanx:)
[3:36] Ahmad Flores: How many times you visit SL per week?
[3:36] Zussa Ryba: every day
[3:37] Ahmad Flores: How long each log in lasts?
[3:37] Zussa Ryba: 2-3 hours
[3:38] Ahmad Flores: What do you enjoy the most in SL?
[3:38] Zussa Ryba: chatting, building, shopping, fly airplanes
[3:39] Ahmad Flores: How did u choose your Avatar?
[3:39] Zussa Ryba: i came here from There.com
[3:40] Zussa Ryba: took my avatar from There
[3:42] Ahmad Flores: Does it resembles your RL you:)
[3:42] Zussa Ryba: inside yes
[3:43] Zussa Ryba: outside not really
[3:45] Zussa Ryba: i wouldnt even tell my best friend here more , sorry
[3:46] Zussa Ryba: sl is second life...
[3:46] Ahmad Flores: its k#
[3:46] Ahmad Flores: Do you have another Avatar?
[3:46] Zussa Ryba: you came here 2 days before me
[3:46] Zussa Ryba: so you should know as much as i do about the secrets we keep here
[3:47] Zussa Ryba: i have only one
[3:47] Zussa Ryba: i dont like people with many avatars
[3:47] Zussa Ryba: its false and cheating in sl
[3:48] Ahmad Flores: 7- Where do you normally go each time you log in?
[3:48] Zussa Ryba: at home - in my island
[3:48] Ahmad Flores: 8- Do you change your Avatar every now and then?
[3:48] Zussa Ryba: yes
[3:48] Zussa Ryba: i have many avatarbodies
[3:49] Zussa Ryba: but i seldom do male avatars
[3:49] Zussa Ryba: its not me
[3:49] Ahmad Flores: what do you change?
[3:49] Zussa Ryba: and as zussa i have my personal look which i like
[3:49] Zussa Ryba: i change clothing
[3:49] Zussa Ryba: and hair
[3:50] Zussa Ryba: never shape and skin
[3:50] Zussa Ryba: i can also be furry and cartoon avatars
[3:51] Ahmad Flores: why u change it?
[3:52] Zussa Ryba: because i love to walk around and explore
[3:52] Zussa Ryba: and i work as a mentor here helping newbies at the born places
[3:52] Zussa Ryba: sometimes i walk around as a newbie to feel how hard they have life here
[3:54] Ahmad Flores: 9- Tell me something you experienced or learned in SL then later tried it or adopt it in RL
[3:54] Zussa Ryba: to be nice and helpful to people
[3:54] Zussa Ryba: and garden planning
[3:55] Ahmad Flores: Would u give me another example?
[3:56] Zussa Ryba: im better in fashion in rl now
[3:56] Zussa Ryba: i learned a lot about it here
[3:57] Ahmad Flores: 10- Do you think your computer limits your experience in SL?
[3:57] Zussa Ryba: no
[3:57] Zussa Ryba: sl limits it
[3:58] Zussa Ryba: i cant fly my planes here as i would - too many red bands and lag
Appendices

[3:58] Ahmad Flores: 11- What do you think of the technology of SL?
[3:58] Zussa Ryba: i love it
[3:58] Zussa Ryba: its intelligent made
[3:59] Zussa Ryba: i like the bugs too
[3:59] Ahmad Flores: : is it easy to navigate?
[3:59] Zussa Ryba: yes
[3:59] Zussa Ryba: after some months its easy
[3:59] Ahmad Flores: 12- Do the details of the place (the design) affects your experience?
[4:00] Zussa Ryba: its too square
[4:00] Ahmad Flores: waht u mean?
[4:00] Zussa Ryba: the island sims are too square
[4:01] Ahmad Flores: 13- Does being surrounded by others enhance or hinder your experience inworld?
[4:01] Zussa Ryba: no
[4:01] Zussa Ryba: i like when someone contacts me
[4:02] Ahmad Flores: 14- One last Q! What do you take home with you from SL?
[4:03] Zussa Ryba: many plans about how to build the sim im goung to purchase next month
[4:04] Ahmad Flores: really thanx for ur time

[3:45] Ahmad Flores: hi
[3:45] Ahmad Flores: can i ask u some general questions about sl for my research?
[3:45] helana Sirnah: sure
[3:45] Ahmad Flores: How many times you visit SL per week?
[3:45] helana Sirnah: probably 4-5
[3:47] Ahmad Flores: How long each log in lasts?
[3:47] helana Sirnah: 2-3hrs
[3:48] Ahmad Flores: What do you enjoy the most in SL?
[3:49] helana Sirnah: exploring
[3:50] Ahmad Flores: why u like exploring?
[3:50] helana Sirnah: fun
[3:51] Ahmad Flores: How did u choose your Avatar?
[3:52] helana Sirnah: i have about ten i use...for fun
[3:52] Ahmad Flores: why you need another one?
[3:53] Ahmad Flores: Where do you normally go each time you log in?
[3:54] helana Sirnah: cant say for sure....
[3:54] helana Sirnah: no place normally
[3:54] Ahmad Flores: Do you change your Avatar every now and then?
[3:54] helana Sirnah: yes
[3:55] helana Sirnah: shapes
[3:56] Ahmad Flores: why u change it?
[3:56] helana Sirnah: u dont go ballroom dancing in a tshirt and jeans
[3:56] helana Sirnah: so i change clothes
[3:56] Ahmad Flores: or you dont go to a pirate villige in a gown
[3:57] Ahmad Flores: Tell me something you experienced or learned in SL then later tried it or adopt it in RL
[3:57] helana Sirnah: nothing
[3:58] Ahmad Flores: 10- Do you think your computer limits your experience in SL?
[3:58] helana Sirnah: no
[3:58] Ahmad Flores: 11- What do you think of the technology of SL?
[3:59] helana Sirnah: dont know
[3:59] Ahmad Flores: how much are you paying me for this survey?
Appendices

[4:00] Ahmad Flores: anything u want
[4:00] helana Sirnah: how many questions are left
[4:00] Ahmad Flores: only 2
[4:00] Ahmad Flores: :)
[4:00] helana Sirnah: 500l
[4:00] Ahmad Flores: 12- Do the details of the place (the design) affects your experience?
[4:01] helana Sirnah: yes
[4:01] Ahmad Flores: in what ways??
[4:01] helana Sirnah: more realistic with good textures and sounds
[4:02] Ahmad Flores: 13- Does being surrounded by others enhance or hinder your experience inworld?
[4:02] helana Sirnah: thats 3 questions
[4:02] helana Sirnah: but no
[4:03] Ahmad Flores: One last Q! What do you take home with you from SL?
[4:03] helana Sirnah: nothing...its sl
[4:03] helana Sirnah: and thats 750l
[4:03] helana Sirnah: for the last two questions
[4:04] Ahmad Flores: :)

[4:09] Ahmad Flores: hi
[4:09] Ahmad Flores: an i ask u some general questions about sl for my research?
[4:10] Hades Heliosense: yeah sure
[4:10] Ahmad Flores: thanx:)
[4:10] Ahmad Flores: How many times you visit SL per week?
[4:10] Hades Heliosense: Per week
[4:11] Hades Heliosense: well twice each day on the weekends nad friday
[4:11] Ahmad Flores: How long each log in lasts?
[4:11] Hades Heliosense: about 1 hour and 30 minutes
[4:12] Ahmad Flores: What do you enjoy the most in SL?
[4:12] Hades Heliosense: The variety of different places that people create
[4:12] Hades Heliosense: and the freedom to create what you want in the world
[4:13] Ahmad Flores: How did u choose your Avatar?
[4:13] Hades Heliosense: i made my avatar based on what i would like to look like in real life
[4:15] Ahmad Flores: in which way?
[4:15] Hades Heliosense: well i would like to wear punk/goth clothes and have my lip and ear pierced
[4:15] Hades Heliosense: but my parents wont let me
[4:16] Hades Heliosense: so i use second life to, imagine what i would be like
[4:16] Ahmad Flores: nice
[4:16] Ahmad Flores: 6- Do you have another Avatar?
[4:18] Hades Heliosense: I have another old avatar, but i dont go on it very much
[4:18] Ahmad Flores: why you need another one?
[4:19] Hades Heliosense: it was my old avatar, but then i borrowed some money from someone
[4:19] Hades Heliosense: and i couldnt pay it back
[4:19] Hades Heliosense: so i made a new avatar
[4:19] Ahmad Flores: Where do you normally go each time you log in?
[4:20] Hades Heliosense: I go looking for some cheap and good clothing shops
[4:20] Hades Heliosense: then i might go to a friends house or go to a dance club
[4:21] Ahmad Flores: 8- Do you change your Avatar every now and then?
[4:21] Hades Heliosense: Yeah, i buy new clothes and hair and stuff
[4:22] Ahmad Flores: what do you change?
[4:22] Hades Heliosense: Mostly the clothes
[4:22] Ahmad Flores: why?
[4:23] Hades Heliosense: It gets a bit boring, looking at the same clothes etc
[4:23] Hades Heliosense: so i buy new clothes
[4:23] Hades Heliosense: or if i find some good clothes at the freebie places i just get those
[4:23] Hades Heliosense: I dont have a credit card in real life, so i cant buy Linden
Appendices

[4:23] Ahmad Flores: 9- Tell me something you experienced or learned in SL then later tried it or adopt it in RL

[4:24] Hades Heliosense: Hmm

[4:24] Hades Heliosense: well most of the people ive met here are very respectful and understanding

[4:24] Hades Heliosense: i learnt that from when i used to play on my old avatar

[4:24] Hades Heliosense: and now ive adopted a new attitude to people


[4:25] Hades Heliosense: I havent gone to colleges or classes in Second Life yet

[4:25] Hades Heliosense: so i might try that also

[4:25] Ahmad Flores: Do you think your computer limits your experience in SL?

[4:25] Hades Heliosense: Yeah i think it does

[4:26] Ahmad Flores: How?

[4:26] Hades Heliosense: When i visit an area with wonderful scenery

[4:26] Hades Heliosense: i want to enjoy that

[4:26] Hades Heliosense: but i cant because of my computer

[4:26] Ahmad Flores: What do you think of the technology of SL?

[4:27] Hades Heliosense: Well the game is definitely a new and innovative technology and design

[4:27] Hades Heliosense: its the first of its type

[4:27] Hades Heliosense: and it still remains the best compared to other similar games

[4:27] Hades Heliosense: such as World Of Kaneva, IMVU etc

[4:27] Ahmad Flores: 12- Do the details of the place (the design) affects your experience?

[4:28] Hades Heliosense: It depends, if its a shopping mall. the design of the place would not affect my experience

[4:28] Hades Heliosense: but say, for example its a scenery place or something like that

[4:28] Hades Heliosense: the design and details are very important

[4:29] Ahmad Flores: 13- Does being surrounded by others enhance or hinder your experience inworld?

[4:30] Hades Heliosense: i can meet new people, socialise with friends i have in real life, meet new people

[4:30] Hades Heliosense: learn new things, enjoy artworks etc made by other people

[4:30] Ahmad Flores: 14- One last Q! What do you take home with you from SL?

[4:30] Hades Heliosense: HMm

[4:31] Ahmad Flores: Well i am an artist in real life

[4:31] Hades Heliosense: and i take alot of artistic inspiration from other people who create things in Second Life

[4:31] Hades Heliosense: i also take home fun and happiness

[4:32] Ahmad Flores: really thanx 4 ur time:)

[4:28] Ahmad Flores: hi

[4:28] Dendo Kips: hey

[4:28] Ahmad Flores: can i ask u some general questions about sl for my research?

[4:28] Dendo Kips: sure

[4:28] Ahmad Flores: thanx

[4:28] Ahmad Flores: How many times you visit SL per week?

[4:29] Dendo Kips: 4

[4:29] Ahmad Flores: How long each log in lasts?

[4:29] Dendo Kips: average 2 hrs, depending on RL commitments

[4:30] Ahmad Flores: What do you enjoy the most in SL?

[4:30] Dendo Kips: meeting new people, especially on voice

[4:31] Ahmad Flores: do u see them at RL?

[4:31] Dendo Kips: nope, never met anyone in rl from sl

[4:32] Ahmad Flores: do u find meeting at SL like meeting in RL?

[4:32] Dendo Kips: i guess as close as you can get to RL (if your using voice)

[4:33] Ahmad Flores: 4- How did u choose your Avatar?

[4:34] Ahmad Flores: still here

[4:35] Dendo Kips: sorry got busy

[4:35] Dendo Kips: well im still choosing it, im only new

[4:35] Dendo Kips: i guess i based it on my RL appearance

[4:36] Ahmad Flores: in which way?
Appendices

[4:36] Dendo Kips: how you mean?
[4:37] Ahmad Flores: i mean Does it resembles your RL you and in which way?:
[4:37] Dendo Kips: well it doesnt much, but i guess the hair mostly
[4:38] Ahmad Flores: 6- Do you have another Avatar?
[4:38] Dendo Kips: nope
[4:38] Ahmad Flores: Where do you normally go each time you log in?
[4:38] Dendo Kips: bear
[4:39] Ahmad Flores: 8- Do you change your Avatar every now and then?
[4:40] Dendo Kips: yes, im still trying to get the avatar i want
[4:40] Dendo Kips: havn't quite perfected it yet
[4:40] Ahmad Flores: what do you change?
[4:41] Dendo Kips: clothes
[4:41] Dendo Kips: what is the point of this research may i ask?
[4:42] Ahmad Flores: its a reseach for a university in englang about sl and ppl inside it:)
[4:42] Dendo Kips: ok
[4:42] Ahmad Flores: 9- Tell me something you experienced or learned in SL then later tried it or adopt it in RL
[4:43] Dendo Kips: hmmmm
[4:43] Dendo Kips: i keep SL seperate from RL, i cant say i have transfered knowledge or experiences from sl to rl
[4:44] Ahmad Flores: 10- Do you think your computer limits your experience in SL?
[4:44] Dendo Kips: nope it is quite good
[4:45] Ahmad Flores: 11- What do you think of the technology of SL?
[4:47] Ahmad Flores: still here?
[4:47] Dendo Kips: yep
[4:48] Dendo Kips: well it is quite basic, they could definatly improve it if they brought it out on CD and instead of it being net based, to make it more stable and less lagg, and all that
[4:48] Ahmad Flores: 12- Do the details of the place (the design) affects your experience?
[4:49] Dendo Kips: yes, the detail is good for a net based game
[4:49] Dendo Kips: it makes it more real
[4:50] Ahmad Flores: 13- Does being surrounded by others enhance or hinder your experience inworld?
[4:50] Dendo Kips: enhance
[4:50] Ahmad Flores: why?
[4:51] Dendo Kips: becasue i like to meet new people
[4:52] Ahmad Flores: 14- One last Q! What do you take home with you from SL?
[4:53] Dendo Kips: nothing really, i leave the 2 worlds apart
[4:53] Ahmad Flores: really thanx for ur time:0
[4:53] Ahmad Flores: :)
[4:54] Ahmad Flores: :)

[4:32] Ahmad Flores: hey
[4:33] Ahmad Flores: an i ask u some general questions about sl for my research?
[4:33] Ahmad Flores: can*
[4:33] Ahmad Flores: How many times you visit SL per week?
[4:34] Cookie Bertone: About 14, usually twice a day.
[4:34] Ahmad Flores: How long each log in lasts?
[4:34] Ahmad Flores: still here
[4:34] Ahmad Flores: :?
[4:35] Cookie Bertone: Well I usually spend most of the day here which is about seven hours and then maybe an hour in the evening.
[4:36] Ahmad Flores: What do you enjoy the most in SL?
[4:37] Cookie Bertone: Most of all it must be the ease in which I can make new aquantances.
[4:37] Ahmad Flores: How did u choose your Avatar?

Loughborough University

110
[4:38] Cookie Bertone: It was a long time ago but I guess it was a desire to represent the person I really am in a virtual environment.
[4:39] Ahmad Flores: Does it resembles your RL you?:)
[4:40] Cookie Bertone: A little bit, there are a few changes here and there. After all if we can't tweak our bodies here what is the point?
[4:41] Ahmad Flores: 6- Do you have another Avatar?
[4:42] Cookie Bertone: Yes, I also have a male avatar. Very good for if I want to go incognito.
[4:42] Ahmad Flores: 7- Where do you normally go each time you log in?
[4:42] Cookie Bertone: It is 50/50 to my shop or a small sky platform in another region.
[4:42] Ahmad Flores: 8- Do you change your Avatar every now and then?
[4:43] Cookie Bertone: I guess you mean appearance. Well I do like to try and teak it a little bit every now and again but if I compare this shape with my original there is very little noticable difference.
[4:43] Cookie Bertone: *TWEAK
[4:44] Ahmad Flores: what do you change?
[4:45] Cookie Bertone: Height mostly, sometimes I tweak the face and bust, trying to make it a little bit more 'perfect'.
[4:45] Ahmad Flores: 9- Tell me something you experienced or learned in SL then later tried it or adopt it in RL
[4:46] Cookie Bertone: Hmmm, another good question. I guess that has to be the kinky sex.
[4:46] Cookie Bertone: I hate to say it but it's true.
[4:46] Ahmad Flores: :)
[4:46] Ahmad Flores: Would u give me another example?
[4:47] Cookie Bertone: Hmmmm...
[4:48] Cookie Bertone: Oh, I guess that has to be build my own furniture. Now I think about it I never tried it until I had done some of it here.
[4:48] Cookie Bertone: Cost me a fortune in tool sthough!
[4:49] Ahmad Flores: 10- Do you think your computer limits your experience in SL?
[4:49] Ahmad Flores: 11- What do you think of the technology of SL?
[4:51] Cookie Bertone: People don't give it enough credit. Linden Labs have created something that is massive in its scale and unlimited in its potential. It is genius. It will get better.
[4:51] Ahmad Flores: 12- Do the details of the place (the design) affects your experience?
[4:51] Cookie Bertone: Oh yes. There is so much bad design here. The small percentage of places that last do it because of their design.
[4:53] Cookie Bertone: The best building and landscape designers will always be respected here.
[4:54] Ahmad Flores: 13- Does being surrounded by others enhance or hinder your experience inworld?
[4:54] Ahmad Flores: - can u give me an example?
[4:58] Cookie Bertone: Each person I meet shows me who they really are as an individual, expressing themselves away from their bodies which could hinder them expressing themselves as they want. Every person I talk to helps me to understand how people communicate and in turn I can communicate better.
[4:58] Cookie Bertone: Does that make sense?
[4:58] Ahmad Flores: yea sure:)
[4:58] Ahmad Flores: 14- One last Q! What do you take home with you from SL?
[5:00] Cookie Bertone: I can escape from reality in SL which helps me relax. I also experiemnt with furnoiture design which I sometimes use in real life.
[5:00] Cookie Bertone: Gotta run, somebody in real life needs me, back in 5 minutes.
[5:01] Ahmad Flores: its k,,thankx for ur time:)

[3:54] hawke Ethaniel: of course
[4:05] Ahmad Flores: thanx:)
[4:05] Ahmad Flores: How many times you visit SL per week?
[4:08] hawke Ethaniel: ummmm, a lot lately...I've met a friend online, but probably only a couple of times a week
[4:08] hawke Ethaniel: :-)
[4:09] Ahmad Flores: How long each log in lasts?
[4:11] hawke Ethaniel: you can stay on as long as you want....but if your character (avatar) isn't doing anything for over half an hour, sl will log you off....so just make sure you touch a button every so often if you are I.m ing
[4:12] Ahmad Flores: What do you enjoy the most in SL?
[4:16] hawke Ethaniel: talking to my contacts (voice) and meeting people. I like being nosy and looking at people's profile's....it's a good way to find out about people
[4:17] Ahmad Flores: : do u see them at RL?
[4:18] hawke Ethaniel: no....but I'm planning to meet one of them one day
[4:19] Ahmad Flores: do u find meeting at SL like meeting in RL?
[4:20] hawke Ethaniel: no, but I love talking to them in voice chat
[4:20] Ahmad Flores: 4- How did u choose your Avatar?
[4:23] hawke Ethaniel: You can buy them...they're calles 'skins'....and some you can modify it in the 'appearance' menu at the top of the screen
[4:24] Ahmad Flores: 5- Does it resembles your RL you?:)
[4:26] Ahmad Flores: still here?
[4:30] hawke Ethaniel: sorry
[4:30] Ahmad Flores: its k
[4:30] hawke Ethaniel: a little. I have my picture on my profile
[4:31] Ahmad Flores: Do you have another Avatar?
[4:33] hawke Ethaniel: no
[4:33] hawke Ethaniel: just this one
[4:34] Ahmad Flores: Where do you normally go each time you log in?
[4:35] hawke Ethaniel: i have my fav rooms...thats on my profile too, in @picks'
[4:35] hawke Ethaniel: 'picks'
[4:35] Ahmad Flores: Do you change your Avatar every now and then?
[4:36] hawke Ethaniel: only my clothes
[4:37] Ahmad Flores: why u change it?
[4:39] hawke Ethaniel: if I'm going into a ballroom, i wear a ball dress, shopping I wear jeans etc
[4:39] hawke Ethaniel: but I kkeep my shape, skin hair etc
[4:40] Ahmad Flores: 9- Tell me something you experienced or learned in SL then later tried it or adopt it in RL
[4:43] Ahmad Flores: still here:) 
[4:49] hawke Ethaniel: ummm
[4:49] hawke Ethaniel: I dont know lol
[4:49] Ahmad Flores: 10- Do you think your computer limits your experience in SL?
[4:49] hawke Ethaniel: no
[4:50] Ahmad Flores: 11- What do you think of the technology of SL?
[4:55] Ahmad Flores: still here:)
[4:55] hawke Ethaniel: lol
[4:55] hawke Ethaniel: are you doing a survey?
[4:55] Ahmad Flores: yes only 2 questions left:)
[4:55] hawke Ethaniel: rofl, who is the survey for?
[4:56] Ahmad Flores: university in england
[4:56] hawke Ethaniel: hit me
[4:56] Ahmad Flores: so What do you think of the technology of SL?
[4:57] hawke Ethaniel: I think it's great...uses too much memory on the computer when it's running though...a lot of ppl have problems with that
[4:57] Ahmad Flores: 12- Do the details of the place (the design) affects your experience?
[4:59] hawke Ethaniel: in what way?
[5:00] Ahmad Flores: if one place have a good design u will be back 2 visit it again
[5:00] Ahmad Flores: ?
[5:02] hawke Ethaniel: deffinately
[5:03] Ahmad Flores: 13- Does being surrounded by others enhance or hinder your experience inworld?
[5:05] hawke Ethaniel: yes, it's great in a social setting, like dance, but not in the more romantic, private ones, like parks, castle's etc
[5:06] Ahmad Flores: 14- One last Q! What do you take home with you from SL?
[5:06] hawke Ethaniel: friends I have met, things we have talked about on voice chat
[5:06] Ahmad Flores: ok, really thanx for ur time:)  
[5:06] hawke Ethaniel: no problem!  

[5:00] Wuz Crosby: hey  
[5:01] Ahmad Flores: hi  
[5:01] Wuz Crosby: how are you  
[5:01] Ahmad Flores: im fine  
[5:01] Ahmad Flores: can i ask u some general questions about sl for my research?  
[5:01] Wuz Crosby: sure  
[5:02] Ahmad Flores: How many times you visit SL per week?  
[5:03] Wuz Crosby: depends if im at home or not if i can i would everyday  
[5:03] Ahmad Flores: How long each log in lasts?  
[5:04] Wuz Crosby: well sometimes a great many hours tonight been on here for 4 hrs but i was making signs for the game for 5hrs before  
[5:05] Ahmad Flores: What do you enjoy the most in SL?  
[5:05] Wuz Crosby: when i have a week or two off i spend more hours on here than a full time job  
[5:05] Wuz Crosby: i enjoy building making designs and selling land  
[5:06] Ahmad Flores: 4- How did u choose your Avatar?  
[5:07] Wuz Crosby: well my avatar wasnt much of a thing for me as i didnt care what i looked like unlike other so i come across some cheap avatars in my business stuff and used one  
[5:08] Wuz Crosby: my outfit is gorean for a role playing game and as for my development i am switching to suit and brief case  
[5:08] Ahmad Flores: Does it resembles your RL you?:)  
[5:09] Wuz Crosby: not really as im a blue collar worker and a shirt and jeans guys as i only seldom wear a suit  
[5:10] Wuz Crosby: i guess i wish i had a business job lots lol  
[5:10] Ahmad Flores: 6- Do you have another Avatar?  
[5:11] Wuz Crosby: one other avatar actually a female one for my roleplay game but i rarely use her  
[5:11] Ahmad Flores: why did u choose another one?  
[5:13] Wuz Crosby: she dont build and have the inventory of my man and i had used here to get closer to my enamy which was a girls camp in the roleplay game  
[5:13] Wuz Crosby: i rarely used her as i got her all suited up i went more into building and business  
[5:13] Ahmad Flores: Where do you normally go each time you log in?  
[5:13] Wuz Crosby: my different land places to up keep them and change as i get the urge and to find things for my business  
[5:15] Ahmad Flores: 8- Do you change your Avatar every now and then?  
[5:16] Wuz Crosby: i might stop for the odd game of dmc but lol ..... i only change my avatar once in a blue moon very rare do i if anything maybe clothes  
[5:16] Ahmad Flores: 9- Tell me something you experienced or learned in SL then later tried it or adopt it in RL  
[5:19] Wuz Crosby: well i actually am thinking of getting into subdividing land in real life and selling it one thing i have learned on the game is location location location as i think about this in my land parcel in real life and i have learned be good to people and it comes back around many times fold  
[5:19] Ahmad Flores: Would u give me another example?  
[5:21] Wuz Crosby: ok one thing i learned in second life is that i like space like in a house and less clutter so i have applied that to real life and threw out alot of stuff and become less cluttered  
[5:22] Ahmad Flores: 10- Do you think your computer limits your experience in SL?#  
[5:24] Wuz Crosby: actually good question i had a old computer and it was slow as heck and i like sl but it turned me away from it but when i got this $6000 dell xps 720 quad core wow the rezzing was fast much better game dumped lots of my games to this again  
[5:25] Wuz Crosby: wish i could play this for a job lol  
[5:25] Ahmad Flores: 11- What do you think of the technology of SL?  
[5:27] Wuz Crosby: i like it theirs things in the game i would change but i sure enjoy alot of the freedom you have in it wish their was more roadways ect make it a nicer game  
[5:27] Wuz Crosby: wish it could rez faster  
[5:29] Wuz Crosby: the game has come along ways in the last 4 yrs for people developing things ect
Ahmad Flores: 12- Do the details of the place (the design) affects your experience?
Wuz Crosby: do you mean as in the details being like the ugly add boxes and stuff placed everywhere grossly in front of some poor persons home who cant have a view kind of stuff ? and if yes this affects my experience yes lol
Wuz Crosby: and if you mean other details like grass and stuff being more realistic and stuff that would make the game way better
Wuz Crosby: the more realistic the better
Wuz Crosby: that would be why i have a physics accelerater really before i need it
Wuz Crosby: what kind of research you doing lol
Ahmad Flores: for a uni
Ahmad Flores: in england
Ahmad Flores: 13- Does being surrounded by others enhance or hinder your experience inworld?
Wuz Crosby: do you mean as in the details being like the ugly add boxes and stuff placed everywhere grossly in front of some poor persons home who cant have a view kind of stuff ? and if yes this affects my experience yes lol
Wuz Crosby: and if you mean other details like grass and stuff being more realistic and stuff that would make the game way better
Wuz Crosby: the more realistic the better
Wuz Crosby: that would be why i have a physics accelerater really before i need it
Wuz Crosby: what kind of research you doing lol
Ahmad Flores: 14- One last Q! What do you take home with you from SL?
Wuz Crosby: i do not mind being around others as long as it dont lag me alot thats one of the down falls of this game is the lag
Wuz Crosby: now if people stand behind my computer chair at home not in the game i do not like
Wuz Crosby: i love to do it releases me from the grueling anxiety of the world as i invlove my self into my game and shut out the world
Wuz Crosby: i can tune out daily problems and relax
Wuz Crosby: the game is somewhat addicting and i dont know if thats the game or the feeling of reilif you get front getting away from lifes problems
Ahmad Flores: really thanx 4 ur time:
Ahmad Flores: hey
VicE Bellic: yes?
Ahmad Flores: can i ask u some general questions about sl for my research?
VicE Bellic: Umm...im new to second life but okkey
Ahmad Flores: thanx:)
VicE Bellic: np
Ahmad Flores: How many times you visit SL per week?
VicE Bellic: I got it yesterday :p
VicE Bellic: y still there?
Ahmad Flores: 3- What do you enjoy the most in SL?
VicE Bellic: Being with my friend’s i think
Ahmad Flores: 4- How did u choose your Avatar?
VicE Bellic: what do you mean?
Ahmad Flores: 5- Does being surrounded by others enhance or hinder your experience inworld?
VicE Bellic: i mean how u choose ur apperance in sl?
VicE Bellic: My friend showed me some freebie boxex and then i put on the things i liked from those boxex....i still dont look very good tough :P
Ahmad Flores: 5- Does it resembles your RL you?:)
VicE Bellic: Nope
VicE Bellic: not yey
VicE Bellic: not yet*
Ahmad Flores: 6- Do you have another Avatar?
VicE Bellic: I havent been avable to make my character look like me yet
Ahmad Flores: 7- Where do you normally go each time you log in?
VicE Bellic: To my friends club
Ahmad Flores: 8- Do you change your Avatar every now and then?
VicE Bellic: Yes
Ahmad Flores: what do you change?
VicE Bellic: umm...
VicE Bellic: well if i find somthing that looks better than what i have on me now i change it watever it is
Appendices

[5:34] Ahmad Flores: :)
[5:34] Ahmad Flores: 9- Tell me something you experienced or learned in SL then later tried it or adopt it in RL
[5:35] VicE Bellic: Nothing yet since i got it yesterday
[5:38] Ahmad Flores: 10- Do you think your computer limits your experience in SL?
[5:38] VicE Bellic: Nope
[5:40] Ahmad Flores: 11- What do you think of the technology of SL?
[5:40] VicE Bellic: What do you mean Technology?
[5:40] VicE Bellic: well you can do alot of things here but the graphics is like the worst iv ever seen
[5:41] Ahmad Flores: why?
[5:42] VicE Bellic: well it looks like shit
[5:42] Ahmad Flores: 12- Do the details of the place (the design) affects your experience?
[5:42] VicE Bellic: yes
[5:43] VicE Bellic: well the better it looks the more realistic it feels
[5:44] Ahmad Flores: 13- Does being surrounded by others enhance or hinder your experience inworld?
[5:44] VicE Bellic: Pther Enhance?
[5:45] VicE Bellic: Other*
[5:45] Ahmad Flores: why?can u give me an example?
[5:46] VicE Bellic: what u learn every day in sl?
[5:46] Ahmad Flores: i havent realned annything yet so i dont know :P
[5:49] Ahmad Flores: ok thanx for ur time:)

Interviews and discussions with random SL users:

[8:04] nha Wisent: help
[8:04] -WaterMelon Laucher v 1.1: Enter Mouselook to shoot me!
[8:04] Secondguess Starostin: what?
[8:04] DARLA Catteneo: im surprised bracken even puts up with you
[8:04] You: hi
[8:04] DARLA Catteneo: LOL but she at least orbits you
[8:04] DARLA Catteneo: LOL
[8:04] Secondguess Starostin: Bracken wuffs me DARLA:S
[8:04] DARLA Catteneo: aweeeeeeerc
[8:05] You: any one can help me here?
[8:05] nha Wisent: idontknow use
[8:05] DARLA Catteneo: just ask ahmad
[8:05] Luk Dastardly: where are you Hakvir
[8:05] XLR8RRICK Hudson: what is your question Ahmad
[8:05] oreiller: releasing controls
[8:05] Shelly Blachere: Sursure Ahmad
[8:05] Secondguess Starostin: <--came here on the basis that he was told he needed help
[8:06] SouLDK Simpson: hi evil darla :>
[8:06] You: im upgrading my account here
[8:06] DARLA Catteneo: Hey SOu!!!!
[8:06] XLR8RRICK Hudson: ok
[8:06] DARLA Catteneo: how ya doing!!!
[8:06] Luk Dastardly: did you go to help island Hakvir
[8:06] DARLA Catteneo: your looking awefully devlish today again
Appendices

[8:06] DARLA Catteneo: hehehe
[8:06] SoulDK Simpson: : >:
[8:07] You: and i enter all the visa information then i click save changes but nothing happend
[8:07] DARLA Catteneo: hows my favorite evil twin doing?
[8:07] DARLA Catteneo: heheh
[8:07] XLR8RRICK Hudson: hum
[8:07] Shelly Blachere: it takes sometime for the information to update
[8:07] Shelly Blachere: it needs to check your card
[8:07] Youlisse Blistter: i m sing ....
[8:07] XLR8RRICK Hudson: you signed into your account on the website
[8:07] Paval Shostakovich: OK--the snow was cool--but let's stop the rain eh?
[8:07] SoulDK Simpson: Shut down that rain at once
[8:07] Youlisse Blistter: inggginggggg the rainnnnnnnnnnn
[8:07] You: yes
[8:08] XLR8RRICK Hudson: how long ago
[8:08] You: and i do the visa thing last week
[8:08] Luk Dastardly: try to find something that says help island
[8:08] Princess Pennell: omg tats so annoyng please stop
[8:08] DARLA Catteneo: how new are you?
[8:08] Youlisse Blistter: well i will back later
[8:08] XLR8RRICK Hudson: I would try again
[8:08] Youlisse Blistter: to do the crazy man :)
[8:08] Youlisse Blistter: again :p
[8:08] DARLA Catteneo: because it only allows certain money once a month until you are established
[8:09] You: i cant understand
[8:09] Youlisse Blistter: ***MooooOOOOoo***
[8:09] Youlisse Blistter: ***I like to MOO-MOO***
[8:09] Youlisse Blistter: ***I like to MOO-MOO***
[8:09] Youlisse Blistter: ***You like to MOOOOO***
[8:09] Youlisse Blistter: ***I like to MOO-MOO***
[8:09] Youlisse Blistter: ***I like to MOO-MOO***
[8:09] Youlisse Blistter: ***I like to MOO-MOO***
[8:09] Shelly Blachere: you are restricted until you have been here a while
[8:09] You: im still basic account
[8:09] Youlisse Blistter: *** i like the Sexy Body***
[8:09] Youlisse Blistter: ***I like the way you MOOOOOOO***
[8:09] Youlisse Blistter: ***I like the sexy body***
[8:09] Youlisse Blistter: ***I like the way i .....!!***
[8:09] XLR8RRICK Hudson: yes I see that
[8:09] Luk Dastardly: i did, let me see if i can bring it back
[8:09] Shelly Blachere: i can give you the web page with the details if you like
[8:09] XLR8RRICK Hudson: try to Upgrade again
[8:09] Nitram Foden: little SouL :)
[8:09] DARLA Catteneo: Nitram!!!!
[8:10] Nitram Foden: Darla!!!
[8:10] Yezdia Miles: hi Nitram :)
[8:10] XLR8RRICK Hudson: fill out the CC info again
[8:10] Nitram Foden: hi hi Yezdia :)
[8:10] SoulDK Simpson: hi nitram
[8:10] You: but i want to know e
[8:10] Secondguess Starostin: Yezzz.....
[8:10] Secondguess Starostin: Dymph says hi:)
[8:10] You: what the problem
[8:10] Oberon Ommura: hi SoulDK
[8:11] XLR8RRICK Hudson: SL has been having trouble the last week or so
Appendices

[8:11] DARLA Catteneo: hey soul where do you get your tail at?? I had someone looking for them earlier?
[8:11] Secondguess Starostin: oh, Dymph says hi to you as well DARLA
[8:11] You: how can i know that they r delete my visa inforamtion
[8:11] Penny Alderson: hi
[8:12] DARLA Catteneo: Hello Ganesha!
[8:12] Del Avro: hallo again
[8:12] Sadie Praga: lol
[8:12] Willamina Fitzgerald: personal space
[8:12] DARLA Catteneo: wb del
[8:12] XLR8RRICK Hudson: if you do not have payment on file you are a Basic member
[8:12] Ganesha Xi: or just haven't entered your payment info ;D
[8:12] Ganesha Xi: not everyone that has entered payment info is premium
[8:12] You: so if they do it twice
[8:13] Ganesha Xi: *purrs*
[8:13] XLR8RRICK Hudson: try to do it again
[8:13] DARLA Catteneo: OK ya all back to work for me
[8:13] Ganesha Xi: bye darla!
[8:13] DARLA Catteneo: catch ya later!!
[8:13] DARLA Catteneo: ***Group hugs*****
[8:13] Shelly Blachere: have you gone through the update my account screen to enter the details or just account details
[8:13] Willamina Fitzgerald: I will be back
[8:13] You: what i have to do after entering the payment info?
[8:13] Secondguess Starostin: yes, just credit card details and I'll sort it all out, ta:) 
[8:13] Luk Dastardly: are you on help island map
[8:14] XLR8RRICK Hudson: after you have Payment details done you Can upgrade your Membership to Premium
[8:14] Secondguess Starostin: hi
[8:14] Secondguess Starostin: I'm in a voice call at the mo
[8:15] You: i click on Upgrade to Premium today!
[8:15] You: and fill all the info
[8:15] XLR8RRICK Hudson: no you need to do the CC info first
[8:15] Citta Levasseur: I coudnt get the say somethign tutorial to work
[8:16] You: what the cc??
[8:16] Shelly Blachere: Ahmad did you press the upgrade account to enter details
[8:16] XLR8RRICK Hudson: Credit Caed
[8:16] XLR8RRICK Hudson: Card
[8:16] SoulDK Simpson: Good day Youlisse i'm SoulDK Simpson Linden Labs Mentor & Welcome to Second Life, How can i Help You ? It has come to our attention that you may be residing on the wrong Second Life grid. The adult grid is for people 18 years old and up. The teen grid is for people between 13 and 17 years of age. just aslong you behave nothing will come in your way , if you have a question or need support, visit our support portal located at http://secondlife.com/community/support.php or the nearest Mentor/Helper! :> have a fab day!.
[8:17] Citta Levasseur: is this still not the real second life?
[8:17] You: i do it after i click on save changes and Premium - Annual
[8:17] You: then i fill my cc info
[8:17] XLR8RRICK Hudson: CC first
[8:17] Citta Levasseur: second life mentor..i'm trying to ask you some things
[8:17] You: what the different??
[8:17] SoulDK Simpson: Citta
[8:18] SoulDK Simpson: i'm in Many many many IM's i would be glad if you could send me one
[8:18] SoulDK Simpson: then i can better help
[8:18] Weasel Fargis: hello charla
[8:18] Citta Levasseur: i dn't know how
[8:18] Citta Levasseur: but i have to go anyhow
[8:19] Janice Binder: Hi
[8:19] You: what about my cc info i saved in the website,its gone now or i can get it back?
[8:19] XLR8RRICK Hudson: I dont think they got it
[8:19] Janice Binder: Hi
[8:20] You: so what i have to do now?
[8:20] XLR8RRICK Hudson: try again
[8:20] Shelly Blachere: as soon as you press to update Ahmed it deletes the info
[8:21] You: but they didnt do the update
[8:21] Shelly Blachere: it takes a while
[8:21] You: i do it last week
[8:21] Shelly Blachere: its not automatic
[8:21] You: in thursday
[8:21] Shelly Blachere: did you do it through the account upgrade page
[8:21] You: yes
[8:22] You: Upgrade/Downgrade your Membership
[8:22] Shelly Blachere: yep
[8:22] You: this one
[8:22] You: Premium - Annual $84.60 ($7.05/month, billed annually)
[8:22] You: then i click save
[8:23] Shelly Blachere: yes thats the correct one
[8:23] You: so what happend?
[8:23] You: i didnt recieve any email from sl
[8:23] XLR8RRICK Hudson: annual is 72/yr
[8:23] Shelly Blachere: are you in europe or usa
[8:23] You: uk
[8:23] Yafone Rang: XL you don't look like someone of 72...
[8:24] Shelly Blachere: its because we pay vat thats why its higher
[8:24] Ganesha Xi: As the policy at http://secondlife.com/whatis/plans.php states about premium upgrade bonus and stipend, Signup bonus is issued only on our confirmation of valid credit card or other identity information and 45 days has passed from the upgrade.
[8:24] Ganesha Xi: mmm templates
[8:24] You: what i have 2 do now?
[8:24] You: i need something 2 confirm my paymant
[8:24] Shelly Blachere: ok what card are you trying to use a CC or a debit/
[8:25] You: i do it last week with my manager
[8:25] Shelly Blachere: I'm uk too Ahmad
[8:25] You: for the company
[8:26] You: nice
[8:26] You: we do the payment for lufbra uni
[8:26] tom01011 Aeon: hi
[8:26] Elena Hykova: Hi SoulDK
[8:26] tom01011 Aeon: how are you
[8:26] SoulDK Simpson: hi Elena
[8:26] Shelly Blachere: ok so its a uni card no worries
[8:26] You: i dont know
[8:26] Ganesha Xi: hnm secondguess you seem to be stuck in an animation. try clicking on tools - stop all animations
[8:27] Elena Hykova: Nitram... hello. And Shelley.
[8:27] You: but its anormal visa i think
[8:27] Nitram Foden: hiya Elena ;)
[8:27] Shelly Blachere: Hi Elena
[8:27] Shelly Blachere: Ok I will IM you a moment and explain a few things
[8:28] Elena Hykova: H'mmm... Mentor Central, lol!
[8:28] You: so i have to wait?
[8:28] Ganesha Xi: ahmad check your spam email
[8:28] You: why?
[8:28] Ganesha Xi: your email may have landed there
[8:28] Nitram Foden: smiles
[8:29] You: ok they do it like this and they enter the VAT
[8:30] Shelly Blachere: ok on the card information it needs to be whomever the card belongs too
[8:30] You: k
[8:30] Shelly Blachere: it may not be any of your details
[8:30] Nitram Foden: afk
[8:30] You: they do it like this
[8:31] Secondguess Starostin: kk, I will be back on voice in a bit
[8:31] Nitram Foden: afk
[8:31] You: what 2 do now??
[8:31] Secondguess Starostin: just on a very special call to my good friend (very good friend) Dymph
[8:31] cheryl Praga: theres lots to do on sl ahmad
[8:32] You: not this
[8:32] You: about the account
[8:32] Vonni Eames: how does one join a group?
[8:32] You: no one can help me here?
[8:32] Shelly Blachere: all i can suggest is to call LL
[8:33] Vonni Eames: How does one join a group?
[8:33] Barbara Iwish: Hi Everyone :-)
[8:33] cheryl Praga: ill show you vonni
[8:33] cheryl Praga: i addeed you vonni
[8:33] cheryl Praga: to my list did you accept friendship
[8:33] cheryl Praga: ok so i can add you to my group
[8:33] Vonni Eames: thank you. how do I do that?
[8:33] Ganesha Xi: hey barbara
[8:34] Vonni Eames: i thought you already went to get food! ^.^
[8:34] Shelly Blachere: the VAT is available from the uni if they wish to claim it back
[8:34] cheryl Praga: ill invite you know
[8:34] cheryl Praga: one sec
[8:34] You: Your current status: Active
[8:34] Shelly Blachere: no VAT is for companies not individuals
[8:34] Barbara Iwish: i've eaten so it's someone else's turn
[8:34] Ganesha Xi: lol
[8:34] You: Next Bill Date: Friday, December 5, 2008 Credit card type: Visa
[8:34] cheryl Praga: i addeed you vonni
[8:35] cheryl Praga: to my list did you accept friendship
[8:35] cheryl Praga: so i can add you to my group
[8:35] Shelly Blachere: ok so it has taken your details
[8:35] SouLDK Simpson: Shelly a person can be taxed Value Added Tax if a transaction being done
[8:35] Ganesha Xi: barbara time for someone else's lunch break? XD
[8:35] SouLDK Simpson: if they reside in europe
[8:35] Vonni Eames: thanks, Cheryl
[8:35] You: this mean that its upgrade it?
[8:35] cheryl Praga: OK ONE SEC
[8:35] Shelly Blachere: yes
[8:35] Ganesha Xi: yes ahmad
[8:35] SouLDK Simpson: the info in your account can't be just set to the US as it tracks via IP adress
[8:36] Ganesha Xi: mmm remind me not to use an EU proxy XD
Appendices

[8:36] SouLDK Simpson: proxy or not..
[8:36] You: how can i take a confirmation
[8:36] Shelly Blachere: In the uk you have to be registeres to claim tax back
[8:36] Vonni Eames: I don't know much and I appreciate the invite!
[8:36] SouLDK Simpson: where you live Ahmad?
[8:36] Shelly Blachere: just print the page
[8:36] You: or an email
[8:37] Shelly Blachere: He's uk
[8:37] cheryl Praga: its oky i was new at tone time to
[8:37] You: what about my land now
[8:37] SouLDK Simpson: registret as a citizen of the UK ?
[8:37] cheryl Praga: did you get it
[8:37] Hakvir Hoobinoo: are you talking to me?
[8:37] You: i dont know
[8:37] Shelly Blachere: you have to find and buy land it doesn't give it to you
[8:37] Hakvir Hoobinoo: hello?
[8:37] cheryl Praga: i sent you the invite
[8:38] Vonni Eames: yes, thank you. How about all those groups you belong to?
[8:38] Shelly Blachere: all it means is that you can own a 512 linden mainland with no tier fee
[8:38] You: now they tell that i will have aland when i upgrade
[8:38] Ganesha Xi: the ability to buy land, yes
[8:38] cheryl Praga: yes im in a lot of them
[8:38] Tapili Amat: au, ganesha ::))
[8:38] Santo Kanto: "mainland" that is :P
[8:38] cheryl Praga: but i have explored sl and got my job so they invite me and i accept
[8:38] Ganesha Xi: hmm?  
[8:38] You: how can i access the 512?
[8:38] Shelly Blachere: no you still have to buy it but it gives you the right to buy lindenland
[8:39] Shelly Blachere: you have to buy it
[8:39] You: no
[8:39] cheryl Praga: is today your 1st time vonni
[8:39] You: they till that when i upgrade they will give me 512
[8:39] cheryl Praga: its simple in a wekk you will have it under
[8:39] Ganesha Xi: no, they give you the ABILITY TO BUY 512
[8:39] cheryl Praga: do you want me to take you somewhere
[8:39] Shelly Blachere: no you DO NOT GET GIVEN LAND
[8:40] Vonni Eames: thanks.
[8:40] Vonni Eames: Yes, please.
[8:40] cheryl Praga: if you do just im me and let me know and ill help you
[8:40] cheryl Praga: ok
[8:40] cheryl Praga: do you want to see the club i dance at or no
[8:40] Vonni Eames: don't know how to IM yet either.
[8:40] cheryl Praga: theres lots here
[8:40] You: Allowed holdings: 512 square meters
[8:40] cheryl Praga: ok you just find the name on the communicate tab
[8:41] cheryl Praga: and you will see send im click the name and send im
[8:41] Ganesha Xi: yes, that means you're allowed to won 512 sq m's
[8:41] Ganesha Xi: *own
[8:42] cheryl Praga: ok ill tp you okay vonni
[8:42] You: ok what this mean?Premium accounts are granted a 512 m2 bonus lease before land use fees are applied. The chart below shows the fees for all land you hold or tier you donate beyond the 512 m2 bonus.
[8:42] Ganesha Xi: it means you are allowed to hold 512m of land before you are subject to a tier increase
[8:42] cheryl Praga: but what do you want to go and see
[8:42] You: You hold 512 m2 of land -- or donate 512 m2 of tier to a group. Your monthly land use fee is US$0
Shelly Blachere: It means you can buy a 512 with no additional monthly payments
Ganesha Xi: if you wish to own more than 512m of land you will be subject to "tier" or a land holding tax, of sorts
You: how much?
Ganesha Xi: the tier increases as you own more land
Shelly Blachere: to buy it all depends just search for it
Shelly Blachere: the average is about 5000L$
Ganesha Xi: http://www.secondlife.com/account choose "land use fees"
Shelly Blachere: depends on size and location
Ganesha Xi: shelly right now it's on a down-swing, you can find 512's for ~3kL$
You: ok so why i have to upgrade if i have to buy?
Ganesha Xi: because LL can't just take land from another land owner and give it to you
Shelly Blachere: because you have no tier fee which as you can see can be quite expensive
Ganesha Xi: mainland is owned by other residents
Ganesha Xi: ultimately it's owned by linden lab, as they own the servers they are housed on
You: u mean that if i didnt upgrade i cant buy
Ganesha Xi: correct
Shelly Blachere: you can but from private sim owners
Ganesha Xi: being a premium member gives you the ABILITY to own land
Absolute Balderdash: onll premium members can own land on the mainland
Shelly Blachere: who can charge whatever they please in the way of tiers
Ganesha Xi: if you buy from private sim owners you are subject to their rules and them paying their own tier to LL
Absolute Balderdash: you can rent land without being premium
Absolute Balderdash: or buy on a private island
Vonni Eames: I'd like to go dancing, Cheryl.
Absolute Balderdash: lots of people have land to rent
Ganesha Xi: if the island owner decides they want to change the rules you are at their mercy, as well as if they decide to not pay for tier anymore
Ganesha Xi: if the island owner quits paying tier *poof* your land goes bye bye
You: nwhat u mean in tier?
Luk Dastardly: hey i see you
Shelly Blachere: Linden land allows you to build whatever you like
Ganesha Xi: tier = land tax
Absolute Balderdash: tier is like a land tax
Shelly Blachere: it is if you like a monthly service charge
You: now after i upgrade i need a 512 land what i have 2 do?
Ganesha Xi: ahmad: search - land sales - mainland - 512m
Luk Dastardly: oh crap, it's confusing enough without all the folders
Absolute Balderdash: find a bit of land u want and buy it
You: 1/128 Region 512 m2 US$5
Ganesha Xi: sheri
Ganesha Xi: You need to put your pants back on, honey *lol*
You: u mean this?
Luk Dastardly: is it nite time?
Sherif Hotshot: yes?
Ganesha Xi: need some help getting dressed?
You: me?
Shelly Blachere: if you use the search then land options
Absolute Balderdash: thats if you go over the initial 512 included in the basic premium membership
Sherif Hotshot: yes please
Ganesha Xi: sheri - click inventory in your lower right corner
Ganesha Xi: do you see it?
Shelly Blachere: use land search and type 512 as your requirement
Sherif Hotshot: i have the inventory out
Appendices

[8:50] Absolute Balderdash: teres a heap of land for sale at anytime
[8:51] Ganesha Xi: ok in library > folder you will see another folder called clothing
[8:51] Ganesha Xi: try some on =)
[8:51] You: but they tell US$5
[8:51] You: its not for buy right?
[8:52] Absolute Balderdash: you buy the land and then pay a monthly tier charge base don the maximum area you have owned each month
[8:52] Ganesha Xi: to put on clothing choose an item, right click, and choose wear
[8:52] You: now u can see that im a basic account or noit?
[8:52] Shelly Blachere: no thats if you go over your free allowance
[8:52] Ganesha Xi: The Land Use Fee (also known as a Tier Fee) is a monthly charge in addition to membership fees (i.e., US$9.95/month Premium Membership). Land use fees are billed based on the peak amount of land held during your previous 30 day billing cycle.
[8:52] Ganesha Xi: there you go sherif
[8:52] Ganesha Xi: Premium accounts are granted a 512 m2 bonus lease before land use fees are applied. The chart below shows the fees for all land you hold or tier you donate beyond the 512 m2 bonus.
[8:53] Absolute Balderdash: lol, intersting skin btw
[8:53] You: i only need 512
[8:53] Shelly Blachere: ok so you need to seach and buy one
[8:53] Flight Band: All Go
[8:54] You: i have to pay a monthly tax too?
[8:54] Ganesha Xi: sherif what kind of internet connection are you on?
[8:54] Absolute Balderdash: yes
[8:54] Sherif Hotshot: can u tell me if I'm wearing anything
[8:54] Ganesha Xi: ahmad: http://secondlife.com/whatis/landpricing.php please click this and read
[8:54] Shelly Blachere: no not if you buy mainland
[8:54] Ganesha Xi: it tells you exactly what you need
[8:54] Ganesha Xi: sherif you are full dressed now ^.^
[8:54] Sherif Hotshot: i can only see my head
[8:54] Absolute Balderdash: if you buy more than 512
[8:54] Absolute Balderdash: no otherwise
[8:54] Ganesha Xi: sherif use your mouse wheel to zoom in/out
[8:55] Extrah Mayo: ribbit
[8:55] Ganesha Xi: croak
[8:55] Sherif Hotshot: i do that, it makes no difference
[8:55] Amourdillo Trenchcoat: excuse me but there is a naked dude in the store >;
[8:55] Amourdillo Trenchcoat: including "ahem" attachment
[8:56] Nitram Foden: is going to do a bit of exploring, see you soon happy people! :)
[8:56] Amourdillo Trenchcoat: so much for PG
[8:56] Sherif Hotshot: like a frog? what do u mean?
[8:58] Sherif Hotshot: barbara wish...can u help me?
[8:59] Quaundre Aluveaux: I know I am basic right now, I know I have to pay taxes then..I know all that..
[8:59] Verrie Short: wow, its knowing
[8:59] Verrie Short: snowing that is
[9:00] BigiGirl Zenovka: my game choking for 3 days now...(
[9:00] Verrie Short: Aye, I crash more than I play
[9:00] BigiGirl Zenovka: my game stutters
[9:00] BigiGirl Zenovka: how solve it
[9:00] BigiGirl Zenovka: is there somebody who knows to have faste game
[9:01] SouLDK Simpson: seems you missout the bangs you have
[9:01] SouLDK Simpson: wich sometimes additionnal attach
[9:01] Sherif Hotshot: my body has disappeared i can only see my head
[9:01] BigiGirl Zenovka: what do you mean
[9:01] SouLDK Simpson: '
[9:01] SouLDK Simpson: relog sherif i see you great
[9:01] Ackerley Levasseur: omg whos dumbest here
[9:01] Verrie Short: I see you Sherif
[9:01] Verrie Short: aye, relog
[9:01] Ackerley Levasseur: basically she can only c her head
[9:01] Ackerley Levasseur: whats so hard lol
[9:02] Verrie Short: ahem, Ackerley, that is not kind
[9:02] BigiGirl Zenovka: i stuuuter since the new update
[9:02] BigiGirl Zenovka: game goes teeribly slow since the new search
[9:02] Ackerley Levasseur: im sorry but it's pretty obvious
[9:02] Hakvir Hoobinoo: is there a way to wave?
[9:02] Verrie Short: press F4
[9:03] Verrie Short: All of your F keys have emotes
[9:03] Verrie Short: I learned that by pressing all my keys :D
[9:03] You: hi again
[9:04] Verrie Short: Hello Ahmad
[9:04] You: i read the info
[9:04] Shelly Blachere: ok
[9:04] Verrie Short: Verrie wonders if Quaundre's watch has real diamonds
[9:04] You: they tell me that if i need 512 i have to pay S$
[9:04] You: monthly
[9:04] Shelly Blachere: no
[9:04] Shelly Blachere: only for an additional
[9:05] Abbotale Noyes: hi
[9:05] Verrie Short: Hi Abbot
[9:05] Hakvir Hoobinoo: i think i did send you the card
[9:05] Verrie Short: Hello Little Lugo
[9:05] You: they tell me that Available for purchase: 512 square meters
[9:06] Lugo Lusch: Hello
[9:06] You: how can i get this?
[9:06] Shelly Blachere: yes thats correct
[9:06] Chiyoa Aichi: Hey..
[9:06] Shelly Blachere: you have to buy one on mainland
[9:06] You: so i only have to buy it
[9:06] Shelly Blachere: yes
[9:06] Hakvir Hoobinoo: Thanks Barbara
[9:06] You: and there is no more monthly payments?
[9:07] Hakvir Hoobinoo: did you get it?
[9:07] You: how can i get this land?
[9:07] You: and i need it in us $
[9:07] Shelly Blachere: ok bottom of the screen
[9:08] You: k
[9:08] Shelly Blachere: search>>>> then land search
[9:08] Shelly Blachere: then type 512 in
[9:08] Verrie Short: Incabaus, you are scary
[9:09] You: they give me many areas
[9:10] CivilWar Ryba: is there a public sandbox here
[9:10] Verrie Short: down below, aye
[9:10] Verrie Short: Someone took me there yesterday
[9:10] CivilWar Ryba: thanks
[9:11] Hakvir Hoobinoo: i can learn them maybe
Hakvir Hoobinoo: if not i will do without
Hakvir Hoobinoo: he he
You: where they go?
SouLDK Simpson: i dont know walking webpage
11g3y Oh: Free Shoes: Would anyone like a pair of ShenS GoGo Red Spike Shoes? Designer Gift; IM me & I'll give them to you.
You: i found it
You: but there are many lands
Shelly Blachere: you need mainland
SouLDK Simpson: Offering objects to random resideency are we t1g3y ?
11g3y Oh: Free Shoes: Would anyone like a pair of ShenS GoGo Red Spike Shoes? Designer Gift; IM me & I'll give them to you.
You: on the search i have to write mainland?
SouLDK Simpson: jon weka if your trying to shoot me think again
11g3y Oh: Do you want them, SouL? I hate to just trash them
SouLDK Simpson: no thanks its not a transaction i trust just out of blue i’m sorry
Ultimate Flight Band: All Go
Giordana Lane: hi shelly. i was billed for a classified auto renewal when i didn't ask for one. i submitted a support ticket but only have a basic membership. Should i do anything else?
11g3y Oh: Nice Free Shoes: Would anyone like a pair of ShenS GoGo Red Spike Shoes? Designer Gift; IM me & I'll give them to you.
You: green land its the same?
Shelly Blachere: did you accidently click the button on the page to renew it?
Giordana Lane: no. i'm positive.
You: i go to search
You: then i click on mainland
Shelly Blachere: yes
You: pg and mature
Shelly Blachere: yes
You: area = 512
You: ok how can i know its in the mainland?
You: because i found in green land#
Shelly Blachere: if you tp to it and look on the covenant
Del Avro: Hi Barbara quick question if thats ok
Shelly Blachere: or check your map for the area
Shelly Blachere: i own LL on gomes
You: they have many names
You: like green, music,...
You: r they all in mainland?
You: WWW.JRUNKNOWN.COM *CHECK IT OUT* WE BUY LAND 24/7
Del Avro: Barbara?
You: this is right?
You: ??????
You: what?
You: no one can answer me?
You: shelly?????
Shelly Blachere: sorry on the phone
You: k
You: =Anilis=
You: “Andrew’s” green flat
Extrah Mayo: nice
You: they in mainland?
You: or not?
You: im waiting
Shelly Blachere: afk
Shelly Blachere: afk
You: what?
You: im waiting:)
You: r u here?
You: This transaction would exceed your daily billing limit by US$56.7. You have already billed US$72.00 of your daily billing limit US$25.00.
You: what this mean?
You: i cant buy ld?
You: any one 2 ask???
Culture Cazalet: You are limited to how much you can buy, as time goes on the limit increases.
Culture Cazalet: Or you can request to have the limit removed.
Culture Cazalet: I suppose you need to email linden labs, there is information if you log into your account in the secondlife.com website.
Tab Enzo: hello everyone
Struckbythunder Aeon: hi
Dudo Ryba: hello Tab
Shelly Blachere: ok back
You: k
Shelly Blachere: sorry had a rl call
You: Isn i found many lands
You: its around 4200
Shelly Blachere: you need to go lock at it then
You: "SLIB Real Estate - Morgause(M) - SL-INVESTORS-BANK.COM
You: this in mainland?
You: ........ Grassland Choerom
You: AAA - LAND FOR SALE in DONALBAIN
Shelly Blachere: no idea you need to check the covenant
Shelly Blachere: you check the covenant on the land
You: where i will find it?
Shelly Blachere: if you click on the land
Struckbythunder Aeon: Hey Tab
Tab Enzo: hey struck
Struckbythunder Aeon: How are you?
Tab Enzo: great i think
You: i click on the map
Struckbythunder Aeon: Confusing huh?
You: they give me many info
Tab Enzo: yes, very
Shelly Blachere: you have to go to the land
You: k
Struckbythunder Aeon: How long have you been here?
You: but i cant buy it in us?
Tab Enzo: 3 minutes
Tab Enzo: hehehe
You: US$?
Struckbythunder Aeon: Cool.
Struckbythunder Aeon: Your character is pretty
Shelly Blachere: so exchange us to $
Tab Enzo: where in the heck are you?
Struckbythunder Aeon: I am sitting in front of you
Tab Enzo: ok, lol
You: they tell me about the limits?
You: that i cany buy it today?
Tab Enzo: i see you now
Appendices

[9:43] Struckbythunder Aeon: Want me to show you a cool place we can go and talk?
[9:43] Tab Enzo: how do i get to this place?
[9:43] Struckbythunder Aeon: I will go there and send you a teleport
[9:44] Yokita Sciarri: sprichst du deutsch?
[9:45] Struckbythunder Aeon: I need to add you as a friend first (unless you would rather not)
[9:45] Tab Enzo: tell me how to get there first
[9:50] You: any one can help?
[9:50] Dudo Ryba: Hi Nikita, I see you are a member of SL English too
[9:51] True Brits Christmas Box shouts: Not permitted to edit this
[9:51] Nikita Felwitch: yes, I am a member 2 days ago
[9:51] Dudo Ryba: I would like to know if you take some classes or exercises
[9:52] You: i want to buy aland
[9:52] Nikita Felwitch: are there classes yet?
[9:52] You: but they tell me i can buy it in mainland
[9:53] Dudo Ryba: I know nothing. I want to get some information how to learn English here. Do you have some experience?
[9:53] Future Buggy (Scripted by Harry): Switching to half power
[9:53] Future Buggy (Scripted by Harry): Switching to max power
[9:53] Future Buggy (Scripted by Harry): Switching to half power
[9:53] You: so what i have 2 do?
[9:54] Nikita Felwitch: No, I have not. I think it has not started.
[9:55] Dudo Ryba: It is my reason to be here to chat with English learner and to find a way to improve my English. What about you?
[9:56] You: I do the upgrading
[9:57] Nikita Felwitch: Yes, too. Are you know other chat-places here?
[9:58] Dudo Ryba: It is pitty, but I have not found any yet. I have only some experiences on the Web. For example BBC learning english.
[9:59] Nikita Felwitch: Yes, I know bbc. And i hear the podcast from ESL in RL. They are very good.
[10:00] Dudo Ryba: I agree. The podcasts are really great way to learn. I would like to know if you are able to communicate with native English well?
[10:00] Zoomorph Schmertzin: Hi Nikita and Dudo, may I make a suggestion?
[10:01] Dudo Ryba: Hi Zoomorph, it is great idea.
[10:02] Dudo Ryba: Zoomorph, do you want to tell us something?
[10:03] Dudo Ryba: Nikita, do you need English for your real life. I mean job, school, etc.
[10:04] Nikita Felwitch: Yes, of course. But its not easy to learn. Why do you learn english?
[10:05] Barbara Iwish: Hi Swifty

[9:51] Barbara Iwish: Problems Ahmad ?
[9:52] Barbara Iwish: It's best that you learn all you can beforehand so that you don't have problems later
[9:55] Barbara Iwish: You can, but you need to be careful & make sure you know the rules & what’s required of both the seller & you to avoid problems, go to the website that I sent you the URL of & read as much as you can before doing anything involving money or promises
[9:56] Ahmad Flores: i do the upgrading
[9:57] Ahmad Flores: and only i need to buy a land
[9:57] Barbara Iwish: Just make sure you know as much as you can & you'll be OK :)..)
[9:57] Ahmad Flores: and they cant let me buy the ls
[9:58] Ahmad Flores: they tell me there r alimits
Ahmad Flores: so what 2 do?
Barbara Iwish: You can do it via the website, that's how I set mine up
Ahmad Flores: do what?
Ahmad Flores: the land or dollars?
Barbara Iwish: L$'s
Ahmad Flores: i do it from there
Ahmad Flores: they tell me there are limites every day
Ahmad Flores: so i have 2 wait until tomorrow?
Barbara Iwish: There are, but once you set up the account the limits will go up
Ahmad Flores: ok i enter all my visa info when i upgrade
Ahmad Flores: i have to do it again with dollars?
Barbara Iwish: If that's your local currency then yes, but I'm in the UK so I use £'s
Ahmad Flores: im in uk 2
Ahmad Flores: i upgrade my account
Ahmad Flores: and i want to buy 512 land
Ahmad Flores: but i have to buy L$ 1st right?
Elena Hykova: Yes... you need the Linden$ to buy the land.
Ahmad Flores: this is the msg
Elena Hykova: Probably correct... have to wait a couple of days.
Ahmad Flores: then i have to enter the visa information again?
Elena Hykova: No, it should be on record.
Ahmad Flores: ok its better to buy the land in mainland or all the same?
Elena Hykova: For 512, you don't pay tier... that's monthly payments.... more than 512, you do.
Elena Hykova: So you buy it, pay for it and that's it.
Ahmad Flores: but i have 2 wait for three or four days?
Elena Hykova: Well... you could set up another free account, what is called an Alt for alternate... using a different name and different email, then, when you have logged into SL with the new avatar, buy Lindens and transfer them to your Ahmad Flores avatar.
Ahmad Flores: nice idea but im working for acompany and im doing this for them
Ahmad Flores: so i cant create another user
Elena Hykova: Why not?
Ahmad Flores: they need 2 see the payment confirmation from my user
Ahmad Flores: and they enter the visa info last time
[4:52] Ahmad Flores: and this user register fro them
[4:53] Ahmad Flores: for*
[4:53] Elena Hykova: OK, fair enough... in that case, you will have to wait a few days. Are you located in USA?
[4:53] Ahmad Flores: no
[4:53] Ahmad Flores: UK
[4:54] Elena Hykova: Right... I was going to suggest you phone Linden Labs and explain the situation..., it's toll-free in the US, but from UK you would have to pay.
[4:54] Ahmad Flores: what the usa number?
[4:55] Ahmad Flores: because i have free card i can use it for free to call any one in usa
[4:55] Ahmad Flores: this is with the country and area code?
[4:56] Elena Hykova: I think the 703 is the Area code... certainly the Country code first, obviously.
[4:56] Elena Hykova: That's the number for credit-card problems, by the way.
[4:57] Ahmad Flores: u know what the country code for usa
[4:57] Ahmad Flores: ?
[4:58] Elena Hykova: It's 00 and then either 1 or 01... phone book will tell you, lol.

[8:07] Shelly Blachere: it takes sometime for the information to update
[8:07] Shelly Blachere: it needs to check your card
[8:37] Shelly Blachere: you have to find and buy land it doesnt give it to you
[8:38] Shelly Blachere: all it means is that you can own a 512 linden mainland with no tier fee
[8:39] Shelly Blachere: you have to buy it
[8:42] Ganesha Xi: it means you are allowed to hold 512m of land before you are subject to a tier increase
[8:42] You: You hold 512 m2 of land -- or donate 512 m2 of tier to a group. Your monthly land use fee is US$0
[8:42] Shelly Blachere: It means you can buy a 512 with no additional monthly payments
[8:42] Ganesha Xi: if you wish to own more than 512m of land you will be subject to “tier” or a land holding tax, of sorts
[8:42] Ganesha Xi: if you wish to own more than 512m of land you will be subject to “tier” or a land holding tax, of sorts
[8:44] Shelly Blachere: because you have no tier fee which as you can see can be quite expensive.
Appendix B

Snapshots taken through the experiments done inside Second life

![Figure 1: Visiting the help land inside SL](image)

![Figure 2: appraisal one of the adverts inside SL](image)
Figure 3: talking to one of users inside Second Life

Figure 4: Interviewing one of the users on a bench inside SL
Appendices

Figure 5: visiting one of the businesses inside SL

Figure 6: Interviewing one of the developers who work for IBM inside their land in SL.
Appendix C

The 2nd version of the CBR web tool.

The Home Page
How the system works:

Need some HELP in developing your land in second life?  
Want to know the kinds of objects that SUIT your land? 
And would you like people to be able to VIEW your objects easily? 

You can find all of that here and its free and easy!

How The System Works?

Similar previous objects are retrieved by searching for objects that match the desired object’s attributes. A set of steps take place until the best matching case is defined. The steps are:
1) The set of problem descriptors are defined.
2) These descriptors are then compared with those of objects within the database and the most appropriate existing objects are selected.
3) The final step is for the best case to be chosen from the closest matching objects already defined in the database.

The retrieval of these previous cases was performed using a similarity equation whereby the results of the new problem are obtained. The matching function is performed to assess the most similar cases to the one being studied. The cases that obtain higher scores are more similar to the new case and will be retrieved before the cases with lower scores.

The weights were chosen according to six descriptors which are:
• Categories: There are seventeen categories covering the SL environment.
• Subcategories: There are various subcategories for each category and the values depend on the main category.
• Price: This has a range of five values related to the price of the object.
• Modifiable: This simply identifies whether the SL object can be modified.
• Copyable: This means that the users have the ability to create copies of the same object.
• Transferable: This attribute means that one user is able to send this object to another user.

Then a priority option for each one, being either High, Normal or Low. The choice of priority chosen changes the weight of the descriptor. The way this is performed is in the form of the priorities allocated to the four descriptors in the new case. These are given weights according to the priority chosen for each descriptor. The user chooses one of the three priorities for each descriptor. These rank from High to Normal to Low.

The option of searching with alternative searching criteria was introduced. This enables the user to change any weight assigned to a descriptor. This will change the similarities of the retrieved cases by changing the results of the similarity equation so that the ranks of the cases received will change to better fit the user’s needs.
Appendices

Step one:

- To start with choosing the category that suite the user request.
Step two:

- Then to choose the subcategory.
Step 3:

- This step is to set the permissions for the object desired with allocating a priority option next to each one with the priority option being either: High, Normal or Low.
Step 4:

- Step 4 is to choose the price range for the desired object.
Appendices

Last step

- An extra step to make the result more accurate.

![Image of Second Life Object Hunter interface]

- To ADJUST this case to match your requirements please write down any CRITERIA you think is required in your desired object!

  Example: fully furnished, house, bedroom, red, animated, soft, etc.

  View Results
Cases Results:

- Here are the cases that give the best solutions to the user after taking his requirements.
Objects results:

- Here are the objects that match the user requirement. The result here depends on the selected solution.
Hunt the object inside SL:

- After showing the results the system now can send the user to the object location inside SL.
Suggestions and ideas:

- This section to take the user feedback after finishing the process where professionally the results could be further changed to meet the users’ demands in similar cases.
Add Objects:

* This section for the users to add their objects in our system so people can be able to view them easily.
Feedback:

* This section for the user to give us his feedback about the whole system for future improvement.
Appendix D

Some parts of the CBR web system source code.

```html
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">
<html>
<head>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1">
<title>Object Hunter</title>
<style type="text/css">
a{text-decoration:none;}
a:hover {color:#FFAE00;}
.menu{
  font-size: 10px;
  font-family: Georgia, Times New Roman, Times, serif;
}
.srchfild{
  border: 1px solid #FABA00;
  height: 16px;
  font-size: 10px;
  width: 170px;
  font-family: Arial, Helvetica, sans-serif;
  background-color:#00303F;
  font-weight: normal;
  color: #ffffff;
}
.srchfild2{
```
```
<script type="text/javascript">
function calcE() {
    var incVAT = document.getElementById("category").value;
    if (incVAT) {
        if (isNaN(incVAT)) {
            alert ("Invalid Value!")
        }
    }
    excVAT = incVAT/1.14;
    document.getElementById("txt2").value = excVAT.toFixed(2);
}

<script language="Javascript1.2"><!-- load htmlarea
_editor_url = ".\lib/"; // URL to htmlarea files
var win_ie_ver = parseFloat(navigator.appVersion.split("MSIE")[1]);
if (navigator.userAgent.indexOf('Mac') >= 0) { win_ie_ver = 0; }
if (navigator.userAgent.indexOf('Windows CE') >= 0) { win_ie_ver = 0; }
if (navigator.userAgent.indexOf('Opera') >= 0) { win_ie_ver = 0; }
if (win_ie_ver >= 5.5) {
    document.write('<script src="'+_editor_url+'editor.js" language="Javascript1.2"></script>');
} else { document.write('<script>'+_editor_url+'editor.js" language="Javascript1.2"></script>'); }
//--></script>
<script type="text/JavaScript">
function MM_openBrWindow(theURL,winName,features) { //v2.0
    window.open(theURL,winName,features);
}

function dosearch() {
    <!-- -->
</script>
if (document.form.name1.value == "){
    alert("Please enter your Name");

    return false;
}

if (document.form.name2.value == "){
    alert("Please enter the Object Name");

    return false;
}

if (document.form.category.value == "")
{
    alert("Please enter the Category");

    return false;
}

if (document.form.category2.value == "")
{
    alert("Please enter the Sub-Category");

    return false;
}

if (document.form.price.value == "")
{
    alert("Please enter the Price");
return false;
}
if (document.form.link.value == "")
{
alert("Please enter the Link");
return false;
}

var url = "2.php?pn="+document.form.pn2.value;
window.action = url;
//-->
</script>
</head>
<body link="#E4E4E4" vlink="#E4E4E4" alink="#E4E4E4" leftmargin="0" topmargin="0" marginwidth="0"
marginheight="0">
<table width="778" border="0" align="center" cellpadding="0" cellspacing="0">
<tr>
<td>
<table width="100%" border="0" cellspacing="0" cellpadding="0">
<tr>
<td><table width="100%" height="157" border="0" cellpadding="0" cellspacing="0">
<tr>
<td width="211" valign="top" bgcolor="00303F"><img src="images/1.jpg" width="211" height="159" border="0" usemap="#Map"></td>
<td width="394" align="left" valign="top">&nbsp;</td>
</tr>
<tr>
<td width="211" valign="top" bgcolor="00303F"><img src="images/1.jpg" width="211" height="159" border="0" usemap="#Map"></td>
<td width="80" bgcolor="00303F">&nbsp;</td>
</tr>
</table></td>
</tr>
<tr>
<td>
<table width="771" border="0" cellspacing="0" cellpadding="0">
<tr>
<td height="80" bgcolor="00303F"></td>
</tr>
</table>
</td>
</tr>
</table></td>
</tr>
</table>
Appendices

<table>
<thead>
<tr>
<th>HOME</th>
<th>ADD YOUR OBJECT</th>
<th>VIEW OBJECTS</th>
<th>YOUR FEEDBACK</th>
</tr>
</thead>
</table>

![Image](images/3.jpg)

![Image](images/4.jpg)
Appendices

Need some HELP in developing your land in second life?
Want to know the kinds of objects that SUIT your land? And would you like people to be able to VIEW your objects easily?

You can find all of that here and its free and easy!!

---

**How The System Works?**

Similar previous objects are retrieved by searching for objects that match the desired object’s attributes. A set of steps take place until the best matching case is defined. The steps are:

1) The set of problem descriptors
are defined.

2) These descriptors are then compared with those of objects within the database and the most appropriate existing objects are selected.

3) The final step is for the best case to be chosen from the closest matching objects already defined in the database.

The retrieval of these previous cases was performed using a similarity equation whereby the results of the new problem are obtained. The matching function is performed to assess the most similar cases to the one being studied. The cases that obtain higher scores are more similar to the new case and will be retrieved before the cases with lower scores.

The weights were chosen according to six descriptors which are:

- Categories: There are seventeen categories covering the SL environment.
- Subcategories: There are various subcategories for each category and the values depend on the main category.
- Price: This has a range of five values related to the price of the object.
- Modifiable: This simply identifies whether the SL object can be modified.
- Copiable: This means that
the users have the ability to create copies of the same object.

Transferable: This attribute means that one user is able to send this object to another user.

Then a priority option for each one, being either High, Normal or Low. The choice of priority chosen changes the weight of the descriptor. The way adaptation is performed is in the form of the priorities allocated to the four descriptors in the new case. These are given weights according to the priority chosen for each descriptor. The user chooses one of three priorities for each descriptor. These rank from High to Normal to Low.

The option of searching with alternative searching criteria was introduced. This enables the user to change any weight assigned to a descriptor. This will change the similarities of the retrieved cases by changing the results of the similarity equation so that the ranks of the cases received will change to better fit the user’s needs.

The case solution retrieved is evaluated. Two results may be produced:

1) If the result is successful, the case is retained and saved in the
database as a new case in order to learn from the success. The success of the object cases retrieved in matching the user’s requirements is determined by the user. If the user decides the result is successful this is noted and the case that was most appropriate is stored in the database for future searches as a good case. This case will then be used in any new searches with similar attribute values. 

2) If the results are unsuccessful then the case base may be adjusted to improve the results returned by the matching process. This adjustment is based on feedback received from users. A feedback section is available for users to make comments and suggestions. Action is taken as a result of the feedback if several different users give the same feedback in similar circumstances or if the developer believes the comment is reasonable and agrees with the feedback given. In such cases the descriptor attributes for some objects may be adjusted so that future similar object searches will give more satisfactory results on subsequent occasions.
<table width="100%" border="0" cellspacing="0" cellpadding="0">
  <tr>
    <td width="60">
      
    </td>
    <td width="273" height="104" align="left" valign="top" background="images/objectb.jpg" style="background-repeat: no-repeat;">
      <table width="100%" border="0" cellspacing="0" cellpadding="0">
        <tr>
          <td width="9" height="104" align="center" valign="middle">
            
          </td>
        </tr>
      </table>
    </td>
    <td height="45" bgcolor="00303F">
      
    </td>
  </tr>
  <tr>
    <td height="45" bgcolor="00303F"&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&n

</td>
</table>

<table width="100%" border="0" cellspacing="0" cellpadding="0">
  <tr>
    <td width="50">&nbsp;</td>
  </tr>
</table>

<appendices>

<tr>
  <td align="left" valign="top"><a href="# name="more.php?pn=229"
onClick="javascript:openWindow(this.name,400,215)">
    <img src="images/viewdesc.jpg" width="97" height="21" border="0" text-decoration = "none"> </a>
  </td>
</tr>
<tr>
sty

</td>
</tr>
</table>
</appendices>
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Loughborough University
<table>
<thead>
<tr>
<th>Owner Name</th>
<th>Object Name</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
<table border="1" cellpadding="0" cellspacing="0" width="100%">
  <tr>
    <td width="70%"><font color="#FFFFFF" size="2"><strong><font face="Arial, Helvetica, sans-serif">
      <select name="category" class="src" id="category" tabindex="2" onChange='javascript:populateData(this.options[selectedIndex].text )'>
        <option value="" selected="selected">All Categories</option>
        <option value="Animals">Animals</option>
        <option value="Animations">Animations</option>
        <option value="Apparel">Apparel</option>
        <option value="Art">Art</option>
        <option value="Audio and Video">Audio and Video</option>
        <option value="Avatar Accessories">Avatar Accessories</option>
        <option value="Avatar Appearance">Avatar Appearance</option>
        <option value="Building Components">Building Components</option>
        <option value="Business">Business</option>
        <option value="Celebrations">Celebrations</option>
        <option value="Gadgets">Gadgets</option>
        <option value="Home and Garden">Home and Garden</option>
        <option value="Miscellaneous">Miscellaneous</option>
        <option value="Recreation and Entertainment">Recreation and Entertainment</option>
        <option value="Scripts">Scripts</option>
        <option value="Vehicles">Vehicles</option>
        <option value="Weapons">Weapons</option>
      </select></font></strong></font></td>
  </tr>
</table>
### Table

<table>
<thead>
<tr>
<th>Sub Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Object Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example: Free, 1000, 5500 etc.</td>
</tr>
<tr>
<td>Object Photo</td>
</tr>
<tr>
<td>--------------</td>
</tr>
<tr>
<td><img src="image.jpg" alt="Image" /></td>
</tr>
</tbody>
</table>

---

**Notes:**

- Ensure the description is clear and concise.
- Use bullet points or numbered lists to enhance readability.
- If the image is complex, consider alternative formats such as diagrams or flowcharts.
Appendices

<script>
<tr>
<td><table width="100%" border="0" cellspacing="0" cellpadding="0">
<tr>
<td width="25%" class="text2">Object Link</td>
<td width="70%"><font color="#FFFFFF" size="2"><strong><font face="Arial, Helvetica, sans-serif">
<input id="link" name="link" accesskey="s" type="text" size="100" class="srchfld" dir="ltr" />
</font></strong></font></td>
</tr>
</table></td>
</tr>
<tr>
<td height="30" valign="bottom"><font color="#FFFFFF" size="-7" face="Arial, Helvetica, sans-serif">
&nbsp;&nbsp;* Enter the SLURL of your land here. <br>
Example: http://slurl.com/secondlife/EastBlue/151/47/526</font></td>
</tr>
</table></td>
</tr>
<tr>
<td><table width="100%" border="0" cellspacing="0" cellpadding="0">
<tr>
<td width="11%"><img src="images/arrow3.jpg" width="30" height="14"></td>
<td width="89%" height="30"><font color="#FFFFFF" size="2" face="Arial, Helvetica, sans-serif"><strong>Object Permissions</strong></font></td>
</tr>
</table></td>
</tr>
<tr>
<td><table width="100%" border="0" cellspacing="0" cellpadding="0">
<tr>
<td width="11%"><img src="images/arrow3.jpg" width="30" height="14"></td>
<td width="89%" height="30"><strong>Object Permissions</strong></td>
</tr>
</table></td>
</tr>
</script>
<table>
<thead>
<tr>
<th>Modifiable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transferable</td>
</tr>
<tr>
<td>Copiable</td>
</tr>
</tbody>
</table>

- Modifiable
- Transferable
- Copiable
Appendices

Ahmad Shubati 2009
Appendices
<script type="text/javascript">
function calcE() {
  var incVAT = document.getElementById("category").value;
  if (incVAT) {
    if (isNaN(incVAT)) {
      alert ("Invalid Value!");
    }
    excVAT = incVAT/1.14;
  }
}</script>
document.getElementById("txt2").value = excVAT.toFixed(2); 

<script language="Javascript1.2"><!-- // load htmlarea
_editor_url = ".\lib"; // URL to htmlarea files
var win_ie_ver = parseFloat(navigator.appVersion.split("MSIE")[1]);
if (navigator.userAgent.indexOf('Mac') >= 0) { win_ie_ver = 0; }
if (navigator.userAgent.indexOf('Windows CE') >= 0) { win_ie_ver = 0; }
if (navigator.userAgent.indexOf('Opera') >= 0) { win_ie_ver = 0; }
if (win_ie_ver >= 5.5) {
document.write('<scr' + 'ipt src="' +_editor_url+ 'editor.js"');
document.write(' language="Javascript1.2"></scr' + 'ipt>');
} else { document.write('<scr'+ipt>function editor_generate() { return false; } </scr'+ipt>); }
//--></script>
<script type="text/JavaScript">
<!--
function MM_openBrWindow(theURL,winName,features) { //v2.0
window.open(theURL,winName.features);
}

function dossearch()
{

if (document.form.name1.value == "")
{
alert("Please enter your Name");

return false;
}
if (document.form.name1.value == ")
{
alert("Please enter your Name");
return false;
}
if (document.form.name2.value == "")
{
alert("Please enter the Object Name");

return false;
}
if (document.form.category.value == "")
{
alert("Please enter the Category");

return false;
}
if (document.form.category2.value == "")
{
alert("Please enter the Sub-Category");

return false;
}
if (document.form.price.value == "")
{
alert("Please enter the Price");

return false;
}
if (document.form.link.value == "")
{
alert("Please enter the Link");

return false;
}
var url = "2.php?pn="+document.form.pn2.value;
window.action = url;
}
//-->
</script>
</head>
<body>
<table width="778" border="0" align="center" cellpadding="0" cellspacing="0">
<tr>
<td>
<table width="100%" border="0" cellspacing="0" cellpadding="0">
<tr>
<td><table width="100%" border="0" cellpadding="0" cellspacing="0">
<tr>
<td width="211" valign="top" bgcolor="#00303F"><img src="images/1.jpg" width="211" height="159" border="0" usemap="#Map"></td>
<td width="394" align="left" valign="top"> <table width="100%" border="0" cellspacing="0" cellpadding="0">
<tr>
<td height="80" bgcolor="#00303F">&nbsp;</td>
</tr>
<tr>
<td height="32" valign="top" background="images/menu.jpg" bgcolor="#00303F" style=" background-repeat: no-repeat;"> 
<table width="100%" height="34" border="0" cellpadding="0" cellspacing="0">
<tr>
<td width="48" class="menu">&nbsp;&nbsp;&nbsp;&nbsp;<a href="index.php">HOME</a></td>
<td width="22"><font size="1" face="Georgia, Times New Roman, Times, serif">&nbsp;&nbsp;</font></td>
<td width="110" class="menu"><a href="add.php">ADD YOUR OBJECT</a></td>
<td width="15" class="menu"><font size="1" face="Georgia, Times New Roman, Times, serif">&nbsp;&nbsp;</font></td>
<td width="86" class="menu"><a href="search1881.php">VIEW</a></td>
</tr>
</table>
</td>
</tr>
</table></td>
</tr>
</table></td>
</tr>
</table></td>
</tr>
</table>
</body>
Our system is designed to try to provide quick and accessible adequate help, advice and useful
material to
Second life
users. If you
feel that there
additional items
that would be
of help or parts
of the site
are unhelpful
or misleading
then please
help rectify
that by providing
us with comments
and suggestions
for improvement!</div></td></tr></table></div></td></tr></table><div>
<form name="form" action="mail.php" method="post" enctype="multipart/form-data" onSubmit="return
doSearch();">
<tr>
<td><table width="100%" border="0" cellspacing="0" cellpadding="0" class="text2">
<tr>
<td>&nbsp;</td>
</tr>
</table></td><td width="30"></td></tr></table></form></div>
Do you think this system is useful?

- Yes
- No
- I don't know
Do you consider the using of previous solutions and learning from it is helpful for you?

<select name="q2" id="q2" class="srchfild3" tabindex="2">
<option value="Yes" selected="yes">Yes</option>
<option value="No">No</option>
<option value="Know">I don't know</option>
</select>
Do you think modelling helps in developing the lands in SL?<br>

Your Feedback:<br>

Your Feedback:
<input name="image" type="image" src="images/submit.jpg" align="middle" hspace="3" />
</div></td>
</tr>
</table></td>
</tr>
</table>
</td>
</tr>
</table></td>
</tr>
</table></td>
</tr>
</table>
</td>
</tr>
</table></td>
</tr>
</form>
</div>
</body>
</html>

<?php
//Class, Managed Connection

//Hande Open, Execute, Close Connection
class connection {
    var $hostname_web;
    var $database_web;
    var $username_web;
    var $password_web;
    var $Connect = NULL;

    function connection() {
        $this->init();
        $this->Connect = mysql_connect($this->hostname_web, $this->username_web, $this->password_web) or die(mysql_error());
        mysql_select_db($this->database_web, $this->Connect);
    }

    function init() {
        $this->hostname_web = "co-project.lboro.ac.uk";
        $this->database_web = "cosa5";
        $this->username_web = "cosa5";
        $this->password_web = "trw93kjr";
    }

    function execute($query) {
        $result = mysql_query($query);
        return $result;
    }

    function executeNoResult($query) {
        mysql_query($query);
    }

    function executeNewID($query) {
}
Appendices

```php
mysql_query($query);
return mysql_insert_id();
}

function free($result)
{
    mysql_free_result($result);
}

function close() {
    mysql_close($this->Connect);
}

//END CLASS
?>

<?php

$txtTitle1 = $HTTP_POST_VARS['name1'];
$txtTitle2 = $HTTP_POST_VARS['desc1'];
$txtTitle3 = $HTTP_POST_VARS['price1'];
$txtTitle4 = $HTTP_POST_VARS['modified1'];

if (mysql_connect('co-project.lboro.ac.uk','cosa5','trw93kjg'))
{
    mysql_select_db('cosa5');
    $query = "SELECT id FROM `pages`;"
    $result = mysql_query($query);

    //$limit = ' LIMIT '.$from.', '.$max;
    $query = "INSERT INTO pages (pn,desc,price,modified)"
$result = mysql_query($query);
$num = mysql_num_rows($result);
if (!$num)
{
    echo 'No records found';
    echo '</body></html>);
    exit;
}
?>

<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1" />
<title>CBR System</title>
<style type="text/css">
.srcfild{
   border: 1px solid #1A4288;
   height: 15px;
   font-size: 11px;
   width: 205px;
   font-family:Verdana, Arial, Helvetica, sans-serif;
   background-color:#ffffff;
   font-weight: normal;
   color: #1A4288;
}
</style>
</head>
<style type="text/css">
.text{

function MM_openBrWindow(theURL,winName,features) { //v2.0
    window.open(theURL,winName,features);
}

function dosearch()
{
    if (document.form.pn.value == "")
    {
        alert("Please enter the PN");
        document.form.pn.focus();
        return false;
    }

    var url = "search.php?pn="+document.form.pn.value;
}

//-->
<?php
include "connection.php";
include "pages.php";
$txtTitle1 = $_POST["name1"];  
$txtTitle2 = $_POST["name2"];  
$txtTitle3 = $_POST["category"];  
$txtTitle4 = $_POST["category2"];  
$txtTitle5 = $_POST["price"];  
$txtTitle6 = $_FILES["photo"];  
$txtTitle7 = $_POST["desc"];  
$txtTitle8 = $_POST["link"];  
$txtTitle9 = $_POST["modi"];  
$txtTitle10 = $_POST["trans"];  
$txtTitle11 = $_POST["copi"];  

$conn = new connection;
$page = new pages;
if (mysql_connect('co-project.lboro.ac.uk','cosa5','trw93kjg'))
{
    mysql_select_db('cosa5');
    $max = 50;
    $query = "SELECT id FROM `pages`";
    $result = mysql_query($query);

    $image = $page->SavePhoto($txtTitle6);
    $value = ";
"}
$value .= ($image == '') ? '' : ',"'.$image.'";

//$limit = ' LIMIT '.$from.', '.$max;

$_query = "INSERT INTO pages
values('',"'.$txtTitle2.'","'.$txtTitle7.'","'.$txtTitle5.'","'.$txtTitle9.'","'.$txtTitle10.'","'.$txtTitle11.'","'.$txtTitle8.'",'.$txtTitle1.','.$txtTitle3.',
'.$txtTitle4.',"'.$image.'")";

$conn->execute($query);
$conn->close();

echo '<meta http-equiv="refresh" content="0;URL=form.php">';
exit;
?&gt;
<table width="100%" border="0" cellspacing="0" cellpadding="0">
<tr>
<td width="5">&nbsp;</td>
<td>&nbsp;</td>
</tr>
</table>
<div id="divMain" style="overflow:scroll;height:500px">
<?php
$counter = 1;
$bgcolor = '#F7F5F5';
while ($line = mysql_fetch_row($result))
{
    $bgcolor = ($bgcolor == "#F7F5F5") ? "#E4EDFF" : "#F7F5F5";

    &lt;table width="856" border="1" align="center" cellpadding="0" cellspacing="0" bordercolor="#D5DEF0"&gt;
<table>
<thead>
<tr>
<th>No.</th>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
<th>Column 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

```php
<?php
$counter++;
}
```
Appendices

```php
mysql_free_result($result);
mysql_close();
}
?>
</table>
<table width="96%" border="0" cellspacing="0" cellpadding="0">
<tr>
<td height="35"><div align="right"><a href="#top"></a></div></td>
</tr>
</table>
</div>
</table>
<tr><td height="10"></td></tr>
<tr>
<td><?php
// $paging = ceil($count / $max);

// $link = 'view.php?view';

// $navigation = ($page > 1) ? ' <a href="'. $link .'&page='. ($page-1) .'">"'. '<img src="previous_submit.gif" style="border:none" />
</a>" : ";

// for ($i = 1; $i <= $paging; $i++)
// {
// $navigation .= ($page == $i) ? ' <a>'. $link .'&page='. $i .'">"'. '<a href="'. $link .'&page='. $i .'">"'. $i .'"</a>
// ;
// }

// $navigation .= '<img src="spacer.gif" />

// $navigation .= ($page < $paging) ? ' <a href="'. $link .'&page='. ($page+1) .'">"'. '<img src="next_submit.gif" style="border:none" />
</a>" : ";

// echo $navigation;
?>
</tr>
```
Appendices

<script type="text/JavaScript">
<!--
function MM_openBrWindow(theURL,winName,features) { //v2.0
    window.open(theURL,winName,features);
}

function dosearch()
{
    if (document.form.pn.value == "")
    {
        alert("Please enter the PN");
        document.form.pn.focus();
        return false;
    }
    var url = "search.php?pn="+document.form.pn.value;
<!-- -->
</script>
Appendices

191

//-->
</script>
</head>

<body link="#E4E4E4" vlink="#E4E4E4" alink="#E4E4E4" leftmargin="0" topmargin="0" marginwidth="0" marginheight="0">
<table width="778" border="0" align="center" cellpadding="0" cellspacing="0">
<tr>
<td>
<table width="100%" border="0" cellspacing="0" cellpadding="0">
<tr>
<td width="211" align="left" valign="top">
<table width="100%" border="0" cellspacing="0" cellpadding="0">
<tr>
<td width="211" align="left" valign="top">
<map name="#Map" id="#Map" background="images/1.jpg" width="211" height="159" usemap="#Map" />
</map>
</td>
<td width="394" align="left" valign="top">
<table width="100%" border="0" cellspacing="0" cellpadding="0">
<tr>
<td height="80" bgcolor="00303F"></td>
</tr>
<tr>
<td height="32" valign="top" background="images/menu.jpg" bgcolor="00303F" style="background-repeat: no-repeat;">&nbsp;</td>
</tr>
<tr>
<td width="211"><img src="images/1.jpg" width="211" height="159" border="0" usemap="#Map" /></td>
</tr>
<tr>
<td width="394" align="left" valign="top">
<table width="100%" border="0" cellspacing="0" cellpadding="0">
<tr>
<td width="48" class="menu" >&nbsp;&nbsp;&nbsp;&nbsp;<a href="index.php">HOME</a></td>
<td width="22"><font size="1" face="Georgia, Times New Roman, Times, serif">&nbsp;</font></td>
<td width="110" class="menu"><a href="add.php">ADD YOUR OBJECT</a></td>
</tr>
</table>
</td>
</tr>
</table>
</td>
</tr>
</table>
</td>
</tr>
</table>
</td>
</tr>
</table>
</body>
## Appendices

<table>
<thead>
<tr>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>216</td>
<td>430</td>
</tr>
<tr>
<td>173</td>
<td>430</td>
</tr>
</tbody>
</table>

![Image](images/addc.jpg)

![Image](images/resultsa.jpg)

![Image](images/resultsa.jpg)

![Image](images/resultsa.jpg)
<table>
<thead>
<tr>
<th>Case</th>
<th>Percentage</th>
<th>View</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>58.1%</td>
<td><img src="view41.php?pn=587" alt="View" /></td>
</tr>
<tr>
<td>2</td>
<td>58.1%</td>
<td><img src="view41.php?pn=394" alt="View" /></td>
</tr>
<tr>
<td>Case 3</td>
<td>41.5%</td>
<td>View</td>
</tr>
<tr>
<td>--------</td>
<td>-------</td>
<td>------</td>
</tr>
</tbody>
</table>

Case 3: 41.5%
Appendices

<map name="Map">
  <area shape="rect" coords="54,54,195,135" href="index.php">
</map>

</html>