Research Report

Team Linden Lab-Capstone Project

Katie Appleton
Jing Jin
EJ Ryu
Steve Won
Diana Yu

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Executive Summary

Second Life has experienced a significant amount of growth, but only about ten percent of these new users have gone on to become active Second Life Residents. This rate of abandonment reveals a need to understand the user experience in Second Life. We, a team of five Masters of Human-Computer Interaction students at Carnegie Mellon University, present in this report our work-in-progress: improving the Second Life experience for its users.

We are working with our Linden Lab correspondents to understand Second Life, focusing on three main areas: how users discover activities in which to participate, how users socialize with each other in a virtual community, and how the identity of a user is created and expressed in a virtual community. During the past semester, we have conducted background, industry, and user research to determine the benefits and problems of current practices in virtual worlds and social networks, particularly Second Life.

We began our research with a literature review to understand the current trends of social networks and virtual worlds. We then analyzed services that are related to Second Life: A feature comparison matrix reveals the similarities and differences between a selection of virtual worlds and social networks; our Strength, Weaknesses, Opportunities and Threats analysis gives an overview of what features help make a service successful; a 2D category graph comparing the object-centric and ego-centric aspects of services against goal-oriented and open-oriented aspects. This research gave us a grounding in the area and guidelines for our future design.

To better understand the user experience, we conducted a survey, four interviews, six Contextual Inquiries (CI), and three Think Alouds. We first identified the types of user who were of interest. We administered a survey to see the overview of current behavior in Second Life as well as other virtual worlds and social networks. We talked to Residents who have left Second Life to understand what motivated them to do so. The social networking expert CIs revealed how they interact with others and manage their identities. We conducted CIs with Second Life experts to see what factors make Second Life valuable for its Residents. The Second Life novice showed us how a resident acclimates. Finally we observed people who had never been exposed to Second Life during their first experience to observe their difficulties and successes.

From our experiences with seasoned Residents and users new to Second Life, we saw a wide gamut of positive and negative experiences. From our Contextual Inquiries with Second Life experts, we observed the importance of groups, which aided social interaction, particularly through events. We observed how identity played an important role in recognizing another Resident as trustworthy or new to Second Life. From the novice Contextual Inquiry we saw again that identity is important to Residents. We also observed how real life relationships can play an important role in a new Resident's experience of Second Life. The Think Alouds revealed how difficult users' first in-world experiences can be.

We go on to conclude that new users are unable to find a solution that satisfies their wants and needs, but that these solutions already exist in some form in Second Life. A communication breakdown exists between the Second Life community and those that wish to join it.

From mid-May until early August, we will be working full-time to create a new design for Second Life based on our research conclusions and build prototypes that will be user tested, aiding us in the refinement of our designs and propelling the iterative process.

1. Introduction

Second Life has experienced a significant amount of growth in the last several years, with over 13 million registered users. However, only about ten percent of these new users have gone on to become active Second Life Residents. As shared in the initial problem description proposed by Linden Lab, when surveyed, those users who had logged on less than 10 times gave two recurring responses: "Allow me to easily find and connect to people I know or who have similar interests " and "Provide content that is entertaining, engaging and relevant to my daily life. " In addition, when considering the user interface, they stated, "Make Second Life easier to use." These three statements underline the challenges facing Second Life

Although addressing specific concerns, the solutions to those three user statements are less than direct. However, user research can be effectively employed to gather qualitative information addressing actual experiences as opposed to hypothetical situations. By observing real life practices, subtle aspects of a problem can be revealed. Once identified, solutions can be tailored to the intrinsic aspects of a problem, and these designs can be further validated through progressive cycles of user testing.

A key aspect of our research is to determine why users are not continuing to use Second Life, and whether their initial expectations differ greatly from their actual experiences in-world. As shown in Linden Lab's abandonment survey, many new Second Life users expect to be involved in a social experience but instead become lost in the complexities of the 3D environment. This leads us to the focus on how social networking and its tools can be utilized to maintain active users in Second Life along with exploring how the standard features can be augmented to aid the new Resident.

Linden Lab is collaborating with Carnegie Mellon University's Human-Computer Interaction Institute (HCII) as part of the eight-month long Capstone Project for the Master's of Human-Computer Interaction (HCI) program. Linden Lab is serving as the industry sponsor for our project team. At the end of the eight-month period, our group of five Masters students will produce a working prototype, serving as a proof of concept, which addresses the new user experience via social networking within Second Life.

1.1 Team Introduction

We are a team of five Human Computer Interaction masters students at Carnegie Mellon University's Human Computer Interaction Institute. Although we all come from diverse backgrounds, we make a cohesive and balanced team. We have all come together at one of the top programs for Human Computer Interaction to refine our skills in this discipline.

Figure 1. Nine, Gloria, Marilyn, Ara, and Jingidy

Katherine (Katie) Appleton (Figure 1, center, aka Marilyn Undercroft) is the project's Design Lead. She graduated from Skidmore College with a B.S. in Art and Computer Science. She has worked both in print and in 3D animation. The latter skill caused her to pursue Computer Science, working primarily in C++ and Java with an interest in artificial intelligence and set theory. She has worked with many graphics tools including Photoshop, Illustrator, InDesign, Flash, and Maya and is comfortable with HTML and CSS. She is also a talented photographer. She practices Contextual Inquiry and Design, Cognitive Walkthroughs, Keystroke Level Modelling, Think Alouds, Heuristic Evaluation, Surveys, Interviews, Personas, Scenarios, Service Design, and Conceptual Modelling.

Jing Jin (Figure 1, top-right, aka Jingidy Dumpling) is the Co-Technical Lead. She is an Accelerated Masters student who studied for her undergraduate degree at Carnegie Mellon University, where she majored in Computer Science with a focus on Computer Graphics and Image processing and Human Computer Interaction. Jing has worked extensively with C, C++, Matlab, Javascript, XUL, HTML and CSS. She is also familiar with OpenGL, GLSL, Java, and Flash. Jing has experience designing and conducting Contextual Inquiries, Interviews, Retrospectives, and Surveys. She has also been involved in the unique challenges of designing for the web and for hand-held devices.

Eunjeong (E.J.) Ryu (Figure 1, bottom-right, aka Ara Ember) is the User Studies Lead. She graduated from Carnegie Mellon University with a B.S. in Computer Science and Psychology and a minor in Physics. She explored a broad range of psychology and concentrated on Graphics in Computer Science. She is skilled at data analysis, utilizing Excel, SPSS, Minitab, and JMP. Along with the traditional HCI methods, EJ excels at designing behavioral research, collecting data, and statistical analysis. An accomplished programmer, she is comfortable with C, Java, OpenGL, Java Swing, Javascript, HTML, Lisp, Fortran, and QBasic. She is also familiar with Flash, Photoshop, and Maya.

Sungjoon (Steve) Won (Figure 1, bottom-left, aka Nine Moulliez) is the Co-Technical Lead. He is an Accelerated Master's student at the HCII Masters program, and studied Computer Science and Human Computer Interaction as an undergraduate at Carnegie Mellon University. He has experience developing in C, Java, JavaScript, Flash (and Flex), HTML, CSS, and XML primarily. Some of the HCI methods he has practiced include Contextual Inquiry & Design, Modeling (Flow, Sequence, Artifact, Physical, and Cultural models), Heuristic Evaluation, Cognitive Walkthrough, Think Aloud, Keystroke Level Modeling, and Affinity Diagramming. He also has experience creating iterative designs based on the user data and building prototypes based on the designs.

Diana Yu (Figure 1, top-left, aka Gloria Cauldron) is the Project Leader. She attended Carnegie Mellon University for her undergraduate education double majoring in Information Systems and Business Administration. Diana has worked for many years as an IT Consultant for IBM Global Services, implementing systems for Fortune 500 clients in a wide range of industries. Her technical skills include C/C++, Java, Javascript, AJAX, and HTML. She can prototype employing HCI Methods, Wireframes, Personas, and Scenarios, among others. Her design skills include working with such programs as Illustrator, InDesign, and Flash.

1.2 Report Overview

In this report, we first present our foci and how they were determined (Section 2). We then cover our background research (Section 3), which consists of literature review and three forms of competitive analysis: a feature matrix, a SWOT analysis, and an industry analysis. Next we present our user studies including our survey, interviews, Contextual Inquiries with social networking experts, Second Life experts, and a Second Life novice, and our Think Alouds (Section 4). We then present our conclusions (Section 5) and our next steps (Section 6). A list of the articles cited (Section 7) closes the document. An extensive appendix follows the text, with the models and documents produced to date.

2. Focus Setting

At the project kickoff meeting, we held a brainstorming session with our correspondents from Linden Lab in order to determine the common areas of interest. We created an affinity diagram, and derived focus questions from the dominant categories within the diagram to guide our research.

An affinity diagram is a tool used to organize ideas and focus the scope of a project. It is often conducted with the stakeholders and the project team in order to create a common understanding and goal. To create an affinity diagram, each participant writes ideas, comments, or concerns on individual note cards. All the participants post their notes on the wall, and the note cards are grouped into categories based on inferred relationships or general topics. The groups are then organized into larger metatopics. When the notes are distilled to a few metatopics, participants decide together on several foci for the project, derived from the consolidated groups in the affinity diagram. These foci serve to create a realistic scope and maintain common goals for the project.

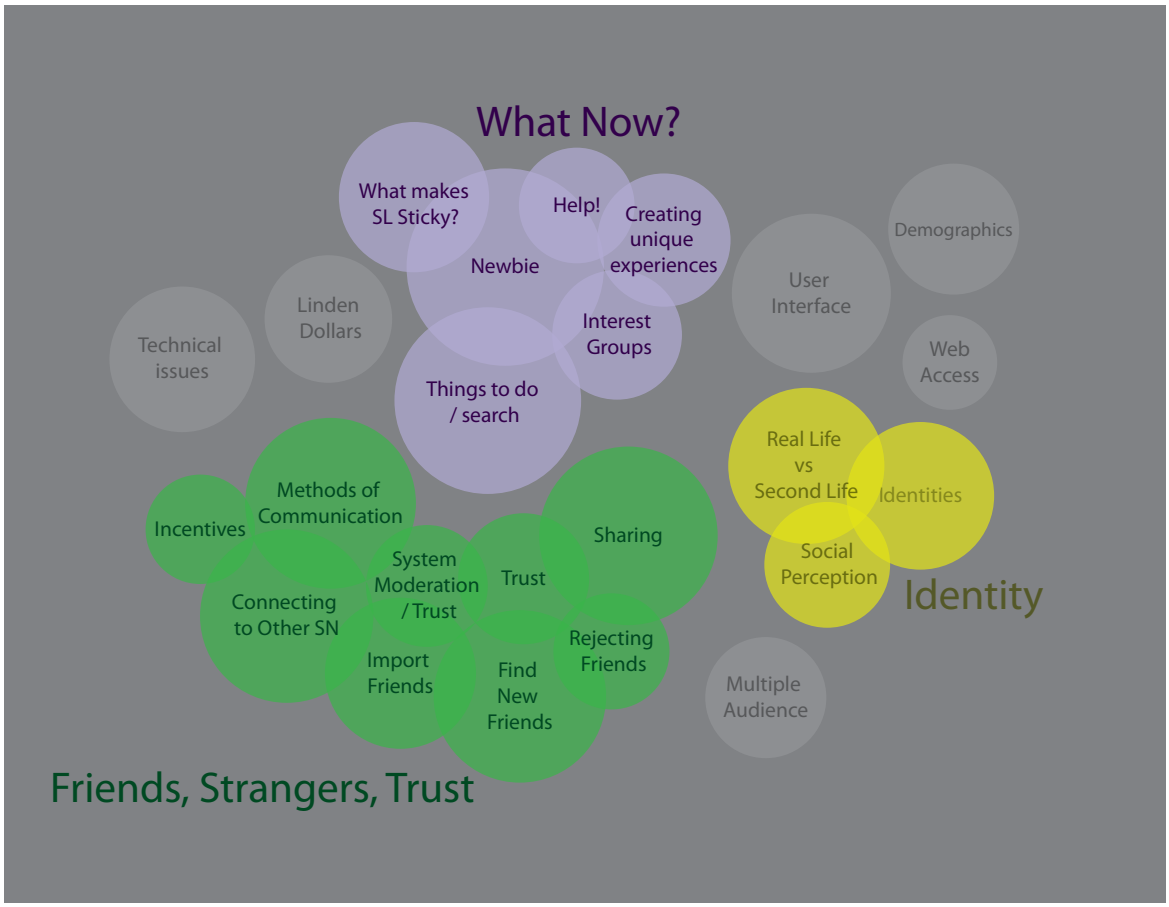

Figure 2. Linden Lab Capstone Project Affinity Diagram

From our affinity diagram (digitalized in Figure 2), we derived three foci:

1. What do I do now?
2. How do I socialize with people in virtual communities?
3. How do I shape my identity/identities in virtual communities?

The first focus question underlines the lack of direction new Residents experience and the difficulty they encounter when attempting to locate activities. The second focus question directs our research to the social aspects of Second Life and to communication's unique manifestation within the virtual framework. The final question focuses our attention on the relationship between Residents' real life identities and the identities of their avatars, compelling us to consider the various aspects of these identities that users are willing to share and to identify those they wish to remain unknown.

3. Background Research

To yield a more complete understanding of the existing competitive space, we have conducted both exploratory research and competitive reviews. The exploratory research involves the assimilation of key points from several articles. The competitive reviews contain analysis of the features of several industry

members, SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis, and the graphing of some of these industry players according to their focus and intended usage. These reviews help set the tone for our user research.

3.1 Exploratory Research

To gain a better understanding of the ongoing trends and issues within the social networks and virtual worlds, we conducted initial background research. Linden Lab provided various articles, cited in the reference section at the end of this document, that cover many different aspects of social networking and virtual worlds. These articles include such issues as privacy, social networking, identity establishment, preferences, and user expectations. Linden Lab connected us with an active researcher in Second Life, doctorial candidate Aleks Krotoski, to help us to understand how to best conduct user research within Second Life. We find many of the issues addressed to be particularly useful and have begun to incorporate many of her insights concerning user research in Second Life into our research approach.

3.1.1 Literature Review

We draw several key conclusions from our literature reviews, outlined below. The index numbers refer to specific articles provided in the reference section, on page 45, at the end of this document.

Virtual communities are places where people express themselves in various ways. The personality of the individual behind the screen affects the type of digital activities in which the users participate, how they manage their friendships, and how they socialize.[1] [6] Such behavior is heavily affected by the age, gender, race, socio-economical status, and educational background of the user along with other factors. [3] Thus the users' real and virtual identities are intimately connected[2], and their online behavior is a reflection of some part of themselves.[7]

The variance in users creates a service paradox. Attempting to address every possible need of every possible user can lead to an experience with great breadth but little depth, causing any possible user to feel his or her needs are unaddressed. However, if a service attempts to fully address a particular group's needs, it becomes too specialized, isolating a majority of users. These users may join a different community, bringing along their real life friends. This mass exodus poses a real threat to virtual communities.[8][9]

A successful online community is supported by the following features: viable content, social interaction, and sustainable rewards for the customer through a sound economy.[10] A virtual community can be both one of shared interest, with people conversing about communal topics or a community of practice where people collaborate to achieve something greater. In either case, a user's sense of participation is paramount to any final outcome or product, augmenting his or her feeling of community and spurring him or her on to further contribution.[10] Many of the virtual communities address migration by incorporating this sense of community action. Third party applications within Facebook or media plug-ins by MySpace are a few examples.[9] However, these attempts can often be overwhelming for users, requiring too much effort to create the applications, and giving little value to the users for which they are intended. In many cases, these applications only irritate users, who, in turn, abandon these social networks, only to find the process of transferring their information to be a daunting task.[8]

People enjoy the idea of consolidating two different services in an attempt to make their life simpler. For example, some people have suggested having a Facebook client in Second Life as an additional feature.

[11] Similar to this idea, Gaia, a virtual world, has successfully implemented itself as an application within Facebook. Gaia has been able to accomplish this because it only requires peripheral attention for a user to remain active.[6] For more complex virtual worlds, the social network needs to be imbedded.

A user's sense of security is an issue that merits close examination. Trust is not just an issue between two users, but also between a user and the service provider. Even the media has reported concerns about Facebook's willingness to track precise details,[14] saving user data for long periods time, perhaps indefinitely. [15] A number of articles voice concern about virtual communities using such information to commercial ends.[14][15]

Some users are less concerned with the topic of security. Sixty four percent of teenage users post pictures, videos, blogs detailing their personal life.[16] In fact, they manipulate the online publication of these materials in order to establish a sense of fame[4], also adding attractive information in their profile to become more popular.[5] However, they find it intrusive or even threatening if their employers or other authority figures view the materials posted. [17]

Users need to be engaged in their online community. Second Life already provides the three necessary features of a successful online community, viable content, social interaction, and sustainable rewards, as well as allowing for intimate connection between users and their online selves. However, Second Life has both breadth and depth, opening themselves to the possibility of any particular user becoming lost before they find something meaningful to them. However, anonymity is sheltered in Second Life, avoiding the possibility of distrust from its users. In contrast, much of its social networking activity occurs outside of Second Life, causing its users to have two separate, instead of combined, services. We will look to resolve this divide and to help guide Residents through Second Life's vast landscape in our design.

3.1.2 Research Advisory Meeting

Figure 3. Meeting with Aleks Krotoski

Aleks Krotoski, a doctorial candidate at the University of Surrey in the Department of Psychology, shared with us a presentation about her experiences researching social networks in Second Life (depicted in Figure 3). According to Krotoski real life and virtual life have some distinct differences. In virtual worlds, users do not share their physical appearances, proximity, or even names; these worlds lack social cues and weaker friendship ties prevail. She asks the question "How can you [trust someone] you've never

met?" This statement underlies much of her presentation.

The lack of those cues present in the real world forces a user's touchpoints to shift to those features available online. Krotoski goes on to point out the different ways Residents bond in-world, highlighting the use of place to create shared experiences, even shared support. Residents base their trust assessments on past experiences. These can be gathered through social networking or obtained from "disinterested third parties." Groups begin to monitor themselves, balancing their decisions against the promise of rejection if a user is found to be unfit.

Trust appears as an underlying theme again and again. Krotoski provided guidelines to aid us in gaining the trust and cooperation of our participants. She advocated complete transparency as to our purpose in-world, suggesting the inclusion of "researcher" in our group name and providing links to and information about our research in our profiles. She also gave other recommendations such as talking to anyone who wishes, following guidelines for ethical research, and being sure to give back to the community who is providing us with this valuable information.

3.2 Competitive Analysis

Social networks and virtual worlds are numerous and diverse. We conducted three forms of industry analysis in order to better understand the varying aspects of these products, their similarities and differences, and the implications of their producers' choices. We first look into the features of multiple virtual worlds and social networks, represented in matrix format. An examination of the strengths, weaknesses, opportunities and threats of various industry players follows. We then examine several products' focus and intended usage.

3.2.1 Industry Features Matrix

As a part of our competitive analysis, we looked into various software products in relevant fields to gain an initial understanding of the industry (a large version, in its original format may be found in Appendix A). By mapping out a two dimensional matrix where one axis acts as the products measure and the other axis acts as the features measure, we can illuminate any significant patterns and gain a big picture understanding of the industry. This analysis has enabled the design of our survey.

This matrix examines products from three main fields: virtual worlds, Massive Multiplayer Online Role-playing Games (MMORPGs), and social networks. We chose these fields because of their relation to Second Life. A virtual world, Second Life is often confused for a MMORPG and shares certain aspects like first person view and navigation of rich 3D environments, where as social networks give good examples of where we would like to take Second Life. The columns correlate to features provided by the services. These bullets describe the intended meaning of the features across the top of the matrix:

- Necessary connection to offline life: A user account must have some tie to the user's true identity. For example, Facebook once required the user prove themselves to be a legitimate student from a university by providing his or her school email address.

- Publicly displayed friends list: There is a publicly displayed friends list of User A that User B can see and traverse through.

• Top Friends List: A user can specify top friends from his or her friends list and have it displayed on their public profile. For example, MySpace has a Top Friends feature.

• Ranking: There is social ranking implemented somewhere within the product. Top Friends List is an example of ranking. World of Warcraft also ranks players based on different merits attained by each player in-world.

• Reciprocal "Friendship": When User A wants to add User B as a friend, User B must accept the friendship for the friendship to be confirmed.

• Privacy Setting in a profile: The product provides various privacy options related to the user's profile.

• Interest Browse/Search: User can browse or search for other users based on a specified interest.

• Groups: User can create or join a group.

• Messaging: There are one or more messaging methods to communicate with other users; e.g., instant message, wall message, etc.

• Voice Chat: Users can communicate using voice enabled chat.

• Contact List: Equivalent features include buddy list, friends list, and others.

• Built-in Mini Activities: There are activities that are not directly related to the product's purpose in which users can engage; for example, playing Tetris or rock-paper-scissors in a virtual world.

• Customizable Avatar: There is a publicly displayed character that a user can customize. For example, facial appearance, clothing, gender, and so on.

• Purchasable Items and Currency: There is some sort of economy within the service initiated by the product.

• Clear Goal: There is a clear goal to using the product; for example, it is clear that a user will use World of Warcraft for gaming experience and the ultimate goal is to level up.

• Missions: There are goals and incentives within the product; they are usually related to the "Clear Goal" of the product discussed above.

• Add-on platform: The product provides a platform that can be utilized by developers to build on; for example, Facebook provides a platform where anyone can build an application.

• Integration into other services: The product is integrated into other products' platforms; for example, Gaia Online has an application on Facebook's platform.

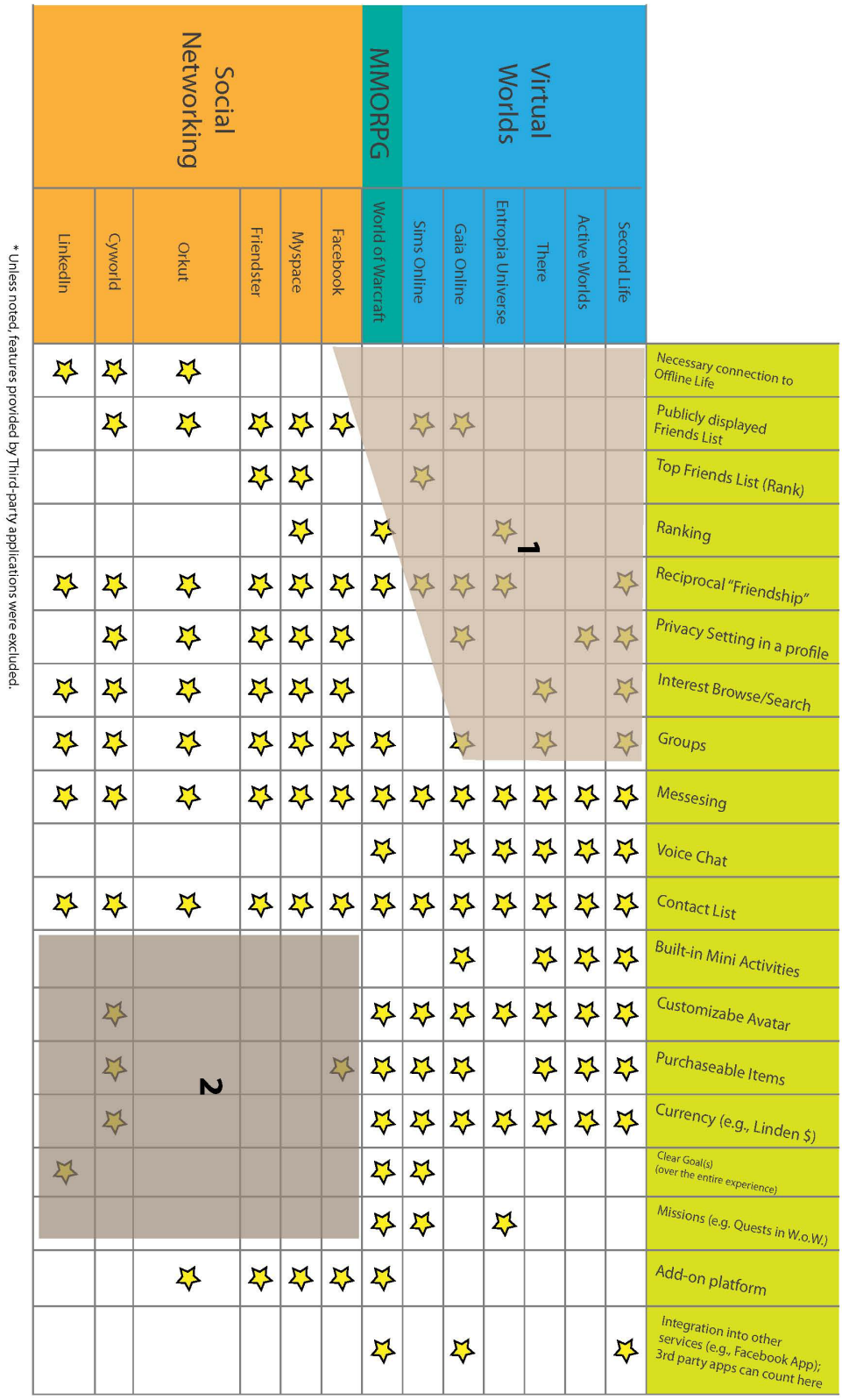

Figure 4. Industry Features Matrix – Areas 1 and 2

Area 1: Depicted in Figure 4, this area shows that many virtual worlds lack some central social network related features. These features include crucial components to social networks, such as a publicly displayed friends list, connection between user's real life identity and social network profile, searching or browsing the network for other users with similar interests, and the ability to create or join groups. The more successful virtual world products, like Second Life and Gaia Online, have more of these features than the other virtual worlds listed.

Area 2: Depicted in Figure 4, this area shows a lack of features in social networks that are prevalent in virtual worlds. These features include avatars, in-service currency and market, specific tasks, like missions for example, for the user to perform in order to progress. One reason that our social network services miss these features is because we focused on ego-centric services instead of object-centric services like YouTube and Flickr.

In the next figure, we reordered the rows and columns. This manipulation helped to reveal those relationships not visible in Figure 5. The original arrangement of the matrix can be found in Appendix A.

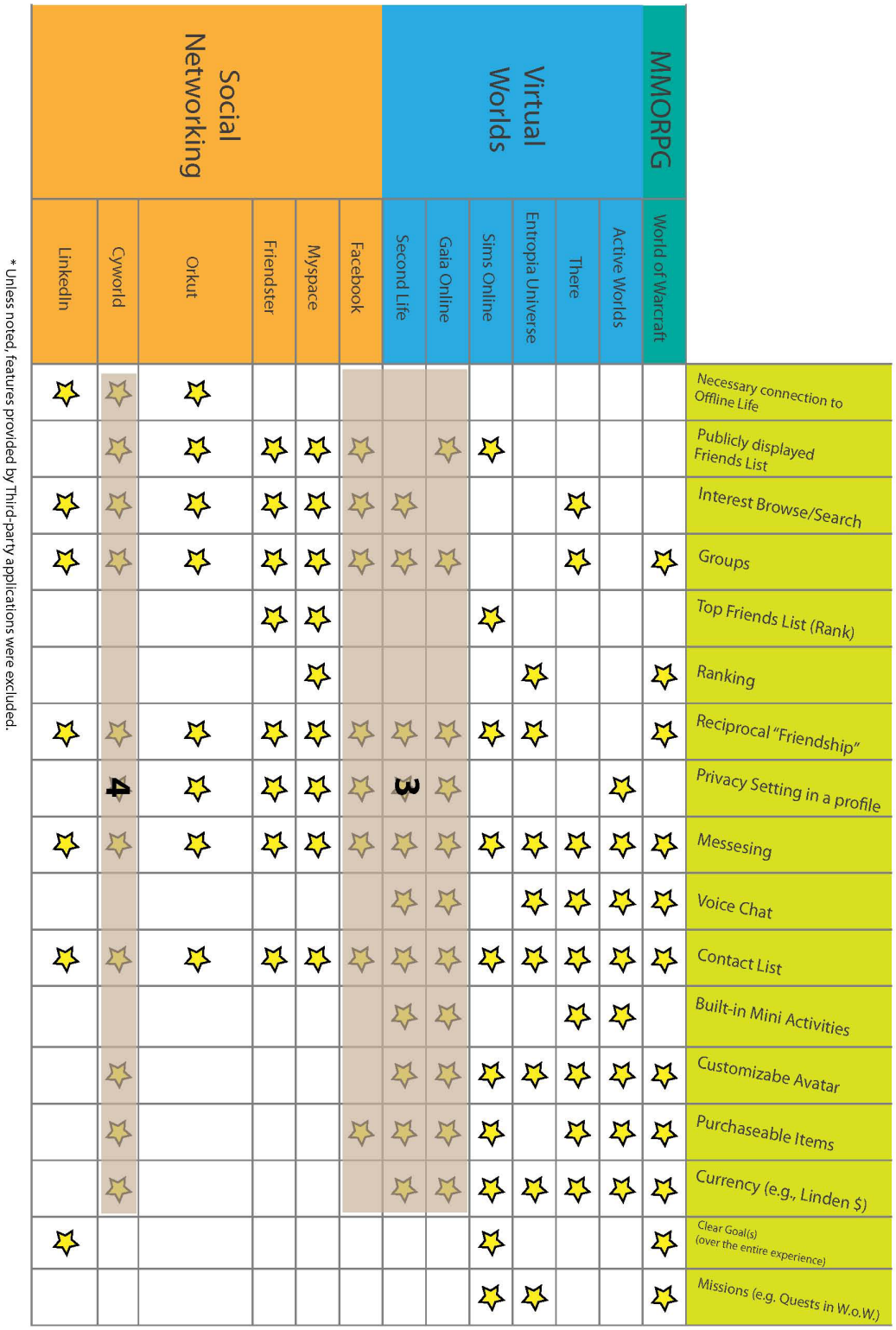

Figure 5. Industry Features Matrix – Areas 3 and 4

Area 3: Depicted in Figure 5, the three most similar services across virtual worlds and social networking are Second Life, Gaia Online, and Facebook. This is determined by looking at which features had significant overlap in starred features. While Second Life and Facebook have comparable features, it is

interesting to note that both serve different user bases and have specialties in separate areas.

Area 4: Based on the matrix depicted in Figure 5, Cyworld provides the most balanced mix of features between social networking and virtual worlds. Cyworld only omits such add-ons as friend ranking, voice chat, mini-activities, and goals/missions.

This matrix suggests several implications: Objects are a feature of many popular virtual worlds. Adding more overt object sharing to Second Life's orientation may aid new users. In addition, Second Life already has many of the basic social networking features, such as groups, friends, browsing/searching by interest, messaging, and so on. This suggests that it is not the absence of these features that causes new Residents to leave Second Life, but their organization and accessibility. Further in this report, we will explore new users' experiences with these features in order to gain a better understanding of how both experts and new users interact with this aspect of Second Life.

3.2.2 SWOT Analysis

As part of our competitive analysis, we conducted a SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats) of Second Life and some of the key competitors, specifically Gaia, World of Warcraft, Facebook, and MySpace, in the virtual world and social networking spaces. We researched these four factors, in order to ascertain what each company was doing well and what areas could be improved. The full SWOT Analysis can be found in Appendix B, pages 49-52, of this document.

Four key considerations for our future prototype design were found from this analysis:

1) Each company has its own core competencies, many of which should be considered in future design ideas.

- Gaia immediately presents users with many activities and things to do, such as watching programs, playing games, chatting, and creating anime.
- World of Warcraft motivates users by encouraging them to accomplish goals in team settings and eases new users into the interaction possibilities by revealing features in stages. At different points during the game, for example, when the user levels up or accomplishes a mission, a small box with a "!" mark appears at the bottom of the screen. The user can click on the box to see the tip or choose to ignore it. The appearance and size of the "!" is small enough to not disturb the user's game play.
- Facebook helps users keep in touch with old friends and acquaintances from real life, as well as find new ones.
- MySpace makes it easy for users to widely customize their profile pages and allows for freedom of expression. MySpace also collaborates with musicians and artists to promote new groups.

2) Users appreciate the ability to easily customize and personalize their spaces within these environments. We noticed user customization as strengths in each company.

- In Second Life, Residents enjoy customizing their avatars, a market in and of itself.
- In Gaia, users can upload their own streaming video.
- Facebook users can easily create their own third party applications.
- MySpace users like being able to customize their profiles. Users enjoy the added autonomy and freedom of expression when customization tools are made readily accessible to them.

- Friendster is one example where lack of customization was a significant factor in user desertion, many of whom switched to MySpace, which made customization easy.

3) Each company has a different business model for generating revenue. Virtual worlds mainly charge users while social networks pair with advertisers. We found that these sources of revenue did not generally overlap over these companies. Second Life could explore if these other avenues make sense to be applied to Second Life.

- Gaia limits circulation of objects in order to create collectors items.
- World of Warcraft charges a monthly subscription.
- MySpace primarily makes money from advertising, as does Facebook to a lesser degree.

4) The primary issue of concern is privacy and security on the internet. These problems exist in both virtual worlds and social networks and is something which Second Life should be aware of as well.

- MySpace must increase security due to sexual predators.
- Gaia has to address issues of parental control.
- Facebook has to be concerned with identity theft because users' information is generally not well protected .

The SWOT analysis gives success stories from various services that can guide us in our design. Motivation is a key factor and can be accomplished by giving the user activities to perform and providing real life connections of friends and interests. Revealing the complexities of the interface in stages helps users to not become discouraged. Security measures are imperative for a user to trust a service. Second Life is already proficient in other areas that we wish to preserve. Everything in Second Life is highly customizable, which is very attractive to users. The economy in Second Life is robust and already a good motivating factor for Residents.

3.2.3 Industry Analysis

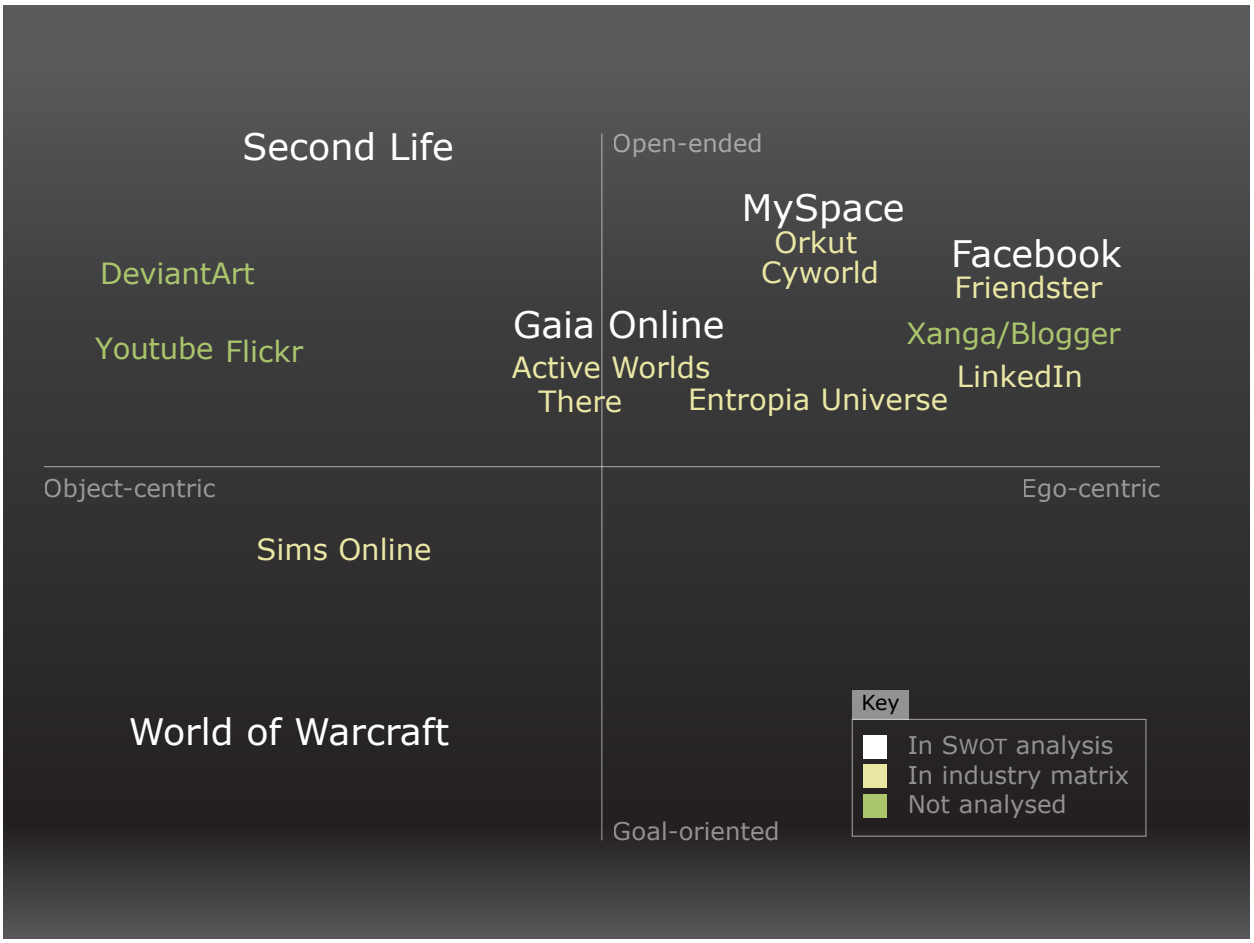

Figure 6. Industry Analysis

We analyzed the services in the industry matrix graph with respect to their focus and intended usage style (Figure 6). This gives us an overview of the domain to which each service belongs. Users of these services design creative methods to accomplish tasks that the service provider originally did not support. In this graph, we only consider the original intent of the service's capabilities, intentionally omitting fixes created by users, often referred to as third party applications, in order to examine the programs at their core functionality.

Comparisons are made with respect to whether a service is open-ended or goal-oriented. An open-ended service provides a variety of activities and does not restrict the user as to an appropriate use for the service. Second Life or MySpace are examples. A goal-oriented service often requires the user to perform certain types of actions to be able to continue using the service in a meaningful way. This usually applies to gaming services, such as World of Warcraft.

We also compare service providers as object-centric or ego-centric. An ego-centric service focuses on the user and the people with whom that user interacts. These services usually provide a link to the user's

real identity, either explicitly or by interaction with others. Most social networks, such as Facebook, are ego-centric, where as object-centric services focus on activities in which the user can participate rather than the user themselves. These tasks can be anything from creating objects to completing missions, neither of which requires a strong tie to the user's identity. Second Life and World of Warcraft are two very different services that are both object-centric.

Of the services graphed, MySpace, Facebook, Orkut, Cyworld, Friendster and LinkedIn are social networks. Second Life, Active Worlds, There, Entropia Universe, Sims Online, and World of Warcraft are virtual worlds. The remaining services straddle the lines between the different categories. For example, Gaia Online is seen as both a virtual world and a social network. DeviantArt, Flickr, and YouTube were originally intended for sharing media. However, many users currently use them to express themselves as well as to communicate with other users. YouTube and Flickr are sometimes referred to as social networks for this reason.

This section shows that traditionally most social networks are ego-centric services. However, it is possible for object-centric services to be social networks if they provide adequate tools for communication and community connection, as is the case with YouTube. We can look to Gaia as a successful example of social network integration within a virtual world, as the Industry Matrix indicates. Cyworld allows for alter egos, in the form of avatars, but still succeeds as a social network. Second Life has many opportunities to include more extensive social networking tools, and the SWOT analysis indicates that several key factors should be taken into consideration: We see that customization is a highly valued feature and something Residents already embrace; users like to be able to easily stay in touch with one another, a point that could be better supported in Second Life; multiple activities are already available in Second Life, but users can be eased into the possibilities by revealing options in stages.

When we look at the sections in combination, we see that it is possible for a service to blur the line between these distinctions and remain a successful tool for its users. However, the question remains as to the optimal approach: Is it best to embed social networking features, provide developers access to produce third party applications, or export your program as a plug-in to another? In the case of Second Life, it is obvious that becoming a plug-in to another application is neither feasible nor desirable. Due to the large and diverse volume of content already available within Second Life, uniformity of the user interface is advisable, negating the value of third party applications for a such a necessarily ubiquitous feature as a social network. The background research suggests that incorporating social networking features directly into Second Life's interface will yield the most usable and reliable social networking service for its Residents, allowing for better communication between its users. User research is needed to determine what and how these services can be incorporated into Second Life to complement and improve the current user experience.

4. User Research

The first step in user research is to define those users whom are of interest. After careful consideration, we defined a list of four users, which we explain in detail. We administered a detailed survey and conducted interviews to compliment our survey findings. We conducted six contextual inquiries, two with social networking experts, three with Second Life experts, and one with a Second Life novice. For each

Contextual Inquiry, we created workflow, cultural, and sequence models. In addition, we performed three Think Alouds with participants who had no prior experience with Second Life.

4.1 Users Overview

In this section of user types, we explore the various combinations of user expertise in Second Life, their current status in Second Life, their experience of social network services, and their virtual world usage. We defined the following four types of users who best fit into our focus:

#	Description	Method	Reason	Related	Aspects to be observed
1	Newer Users (< three months) in Second Life, who are experienced with social networks and Virtual World	Contextual Inquiries, Interviews, Surveys	We would like to observe the experiences of new users who are already familiar with the concept of social networking and virtual world as they use SL. These users would have some expectation what SL should be like, and since they still an active resident, they have motivation to continue to use SL. We would like to see what they think about Second Life and how it fits/differs from their previous experiences, and what motivated them to come to the second life, etc.	What Now, Social Management, Identity	What they do, What they like/dislike about Second Life, What is their expectation, What is their motivation, how do they explore world, Who do they communicate with
2	Experts in Second Life: Power users who have been using Second Life longer than a year.	Contextual Inquiries, Surveys	We would like to observe the expert/power users of Second Life in-world in hopes to find what motivates them to stay in SL and how they are different from User Type #1 in social behaviors and specific activities.	What Now, Social Management, Identity	What they do, What they like/dislike about Second Life,What is their goal, What is their motivation, Who do they communicate with
3	Active users in Social Network, who left Virtual World (specifically Second Life)	Interviews, Surveys	We are specifically interested in the aspects these users found lacking in Second Life that they are finding in the social networks in which they are currently active.	What Now, Social Management	Their opinion on social networking services and virtual worlds. Why they left the virtual world.
4	People with multiple Social Network Accounts	Contexual Inquiries, Interviews, Surveys	We would like to see how the people use their social networks to shape their own identity, how they manage their friends in different social networks, and what attracts them to additional social networks. This will help us to learn how to integrate Second Life into people's usual social networking activity.	Identity, Social Management	How people define themselves in public profiles, How does adding friends work, What features in Social networking sites do people use often, what makes them come back to the social networking sites.

Figure 7. User Table

4.1.1 New Second Life Users

We selected new users who have been using Second Life for more than a month but less than three months (User type 1 in Figure 7). This range ensures the user is actually interested in Second Life enough for continued use, but is still within the exploratory phase. We especially take interest in users who have experience with social networks and possibly other virtual worlds. In this way, we locate users who would have some expectation of what Second Life should be like. Using Contextual Inquiries, interviews, and surveys, we observed the motivations that lead them to use Second Life. We studied the impressions they have about Second Life and how they fit or differ from their previous experiences of social networking and

other virtual worlds, focusing on the expectations they have for Second Life. To complement our research, we also observed users with no experience with Second Life through Think Alouds in order to understand Residents' first time experience.

4.1.2 Second Life Experts

Through Contextual Inquiries, interviews and surveys, people who have been residents of Second Life for longer than one year (User type 2 in Figure 7) show us the incentives that exists in Second Life which motivate them to remain active in this virtual world for the long term. We also compared these users to the new Second Life users to find out how the motivation, activities, and expectations have changed, eventually educating us in how people adapt as Residents of Second Life.

4.1.2 Users who left Second Life

For whatever reason and at various stages of use, many Residents decide to no longer use Second Life (User 3 in Figure 7). This type of user has left and may or may not be seeking an alternative virtual world. We suspect that the newer of these users have different motivations to join Second Life as well as different expectations than the people who stay for an extended time in Second Life. Through interviews and surveys, we see why they left Second Life and, if applicable, what conditions engaged the user in one virtual environment and not another.

4.1.3 Social Networks Experts

Social networking is another focus in this project, in conjunction with our users' management of friends and strangers. We decided to look at how people use purely social networking services (User type 4 in Figure 7), instead of looking through virtual worlds, which have many different activities that may not be particularly social networking oriented. Through Contextual Inquiries, we observed people actively using multiple social networking services, revealing to us how these people manage their friends in different social networks and what attracts them to additional networks. We are also interested in how the active use of multiple services can shape a user's identity in the virtual environment. This has helped us learn how to integrate Second Life into consumers' usual social networking activities.

We employed four methods of user study: surveys, interviews, Contextual Design, and Think Alouds. Surveys allow us to gain an understanding of what the majority of users experience. Interviews allow us to probe in more detail into user experience for aspects that are difficult to observe directly. Contextual Design allows us to focus on detailed aspects of a few users' experiences. Think Alouds reveal the new user experience.

4.2 Surveys

The process of conducting a survey is comprised of two parts: question and answer formulation, and statistical analysis. Survey questions need to be easy to understand, since the researcher is usually not present to explain ambiguities to the participant, and unbiased so the participant does not feel obligated to provide data that supports the researcher's argument. Often, surveys also need to be succinct because

the absence of the researcher lessens the feeling of obligation to complete the survey. Due to these aspects, surveys questions should be created by or reviewed with experts in the area.

In our survey, we focused on the data from Second Life experts, new Second Life users, and people who left Second Life for another virtual world. Our survey covered such topics as users' motivations to use Second Life, virtual worlds and their social networks, and their usual activities in these services. We asked about their initial reasons for joining each virtual world and their current reason for logging-on, as well as what activities they engage in most often. We also inquired after their experiences of dealing with strangers by asking how comfortable they were the last time a stranger spoke to them and how comfortable they were starting conversations with strangers, if they ever do. We probed their privacy knowledge by questioning their privacy setting practices and what type of information they are comfortable sharing in their profile. We were also interested in their group activities, inquiring whether they have joined any, how they located them, and if they wished there were more and of what kind. We designed questions to determine how users make and keep friends: "What kind of things do you look at before you accept a person as a friend in a social network?" and "How do you keep in touch with the people you've met (in this virtual world/Second Life)?" Our survey questions had rules/logic applied to be able to determine what type of user the respondent is based on his or her responses and show the user to the appropriate sections.

4.2.1 Survey Analysis

Through our survey, we were able to gain a basic grasp of these topics and the general differences between populations' various activities among these three services. We received enough background knowledge of our users to successfully conduct interviews, discussed in the next section, exploring the issues listed above at a deeper level. A full list of questions is available in Appendix C on page 53.

Two hundred and ninety-three people responded to our survey. We recruited people from various message forums, social networks, virtual worlds (VW), and Second Life (SL) itself. Among these respondents, 147 had experiences with Second Life, 117 had experiences with virtual worlds, and 265 had experiences with social networking services. Within 147 Second Life users, 98 people identified their length of experiences: 64 people were in Second Life for more than one year, 12 people were on 6 months to a year, 13 people were on 1-6 months, and 8 people were on less than a month. We also separated the virtual world users into people who had experiences with Second Life and people who did not, so as to be unbiased by the users who are comparing Second Life with other virtual worlds.

In order to determine the how the abandonment patterns in Second Life differ from abandonment patterns in other virtual worlds, we created Figures 8 and 9, shown on the following page.

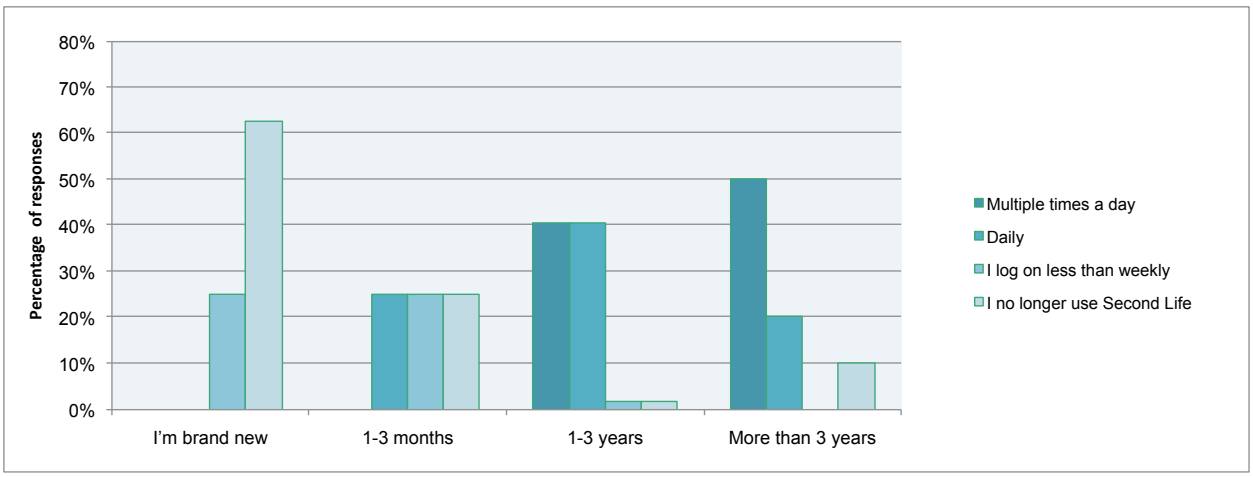

Figure 8 Log on Frequency vs. length of Residency in Second Life

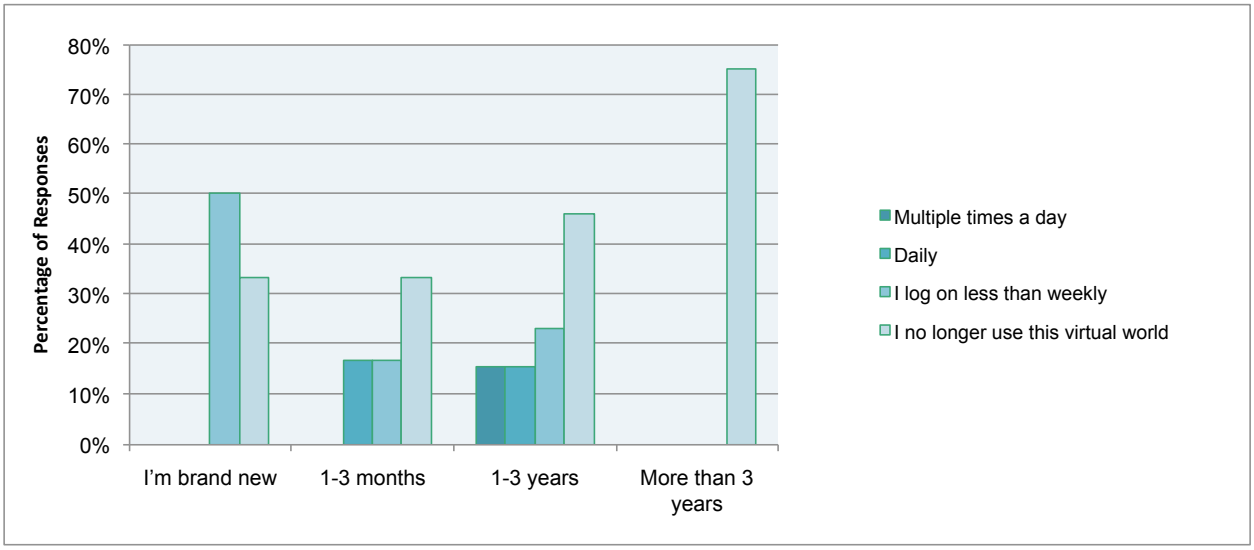

Figure 9 Log on Frequency vs. length of Residency in Virtual Worlds

We found an interesting difference in the two trends. While the majority of people left Second life early on, the people who remained began to use Second Life more frequently; after three years of experience with Second Life, 50% used it multiple times a day. (Figure 8) In contrast, the people who used other virtual worlds, the majority of whom used World of Warcraft, were increasingly likely to leave as time passed, and by three years or so, 75% of people no longer used the same virtual world (Figure 9). This observation led us to inquire as to what causes people to leave other virtual worlds and what makes people leave Second Life (Figure 10, on the following page).

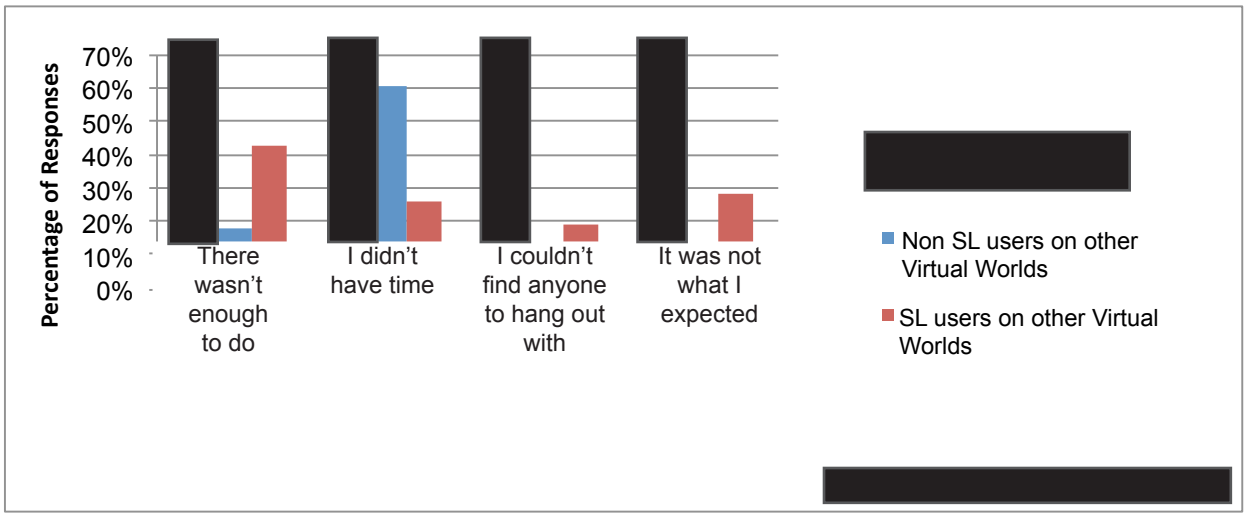

Figure 10 Abandoment Reasons from non-SL users about VW, SL users about VW and SL users about SL

Our survey showed the virtual world users who had no Second Life experience left mainly because they no longer had enough time. Yet when people had experiences with Second Life, they did not find other virtual worlds as time consuming, but they said that those worlds did not have enough activities. They found the other virtual worlds uninteresting and not a match to their expectations. In most of these cases, Second Life was their most frequently used virtual world.

those who used Second Life longer reported that they found plenty of activities (Figure 11, 12 on the following page). This set found other virtual worlds disappointing and did not have enough things to do. To shed light on what these "things" are, we looked at the reason Residents logged on to Second Life for their most recent session (Figure 11).

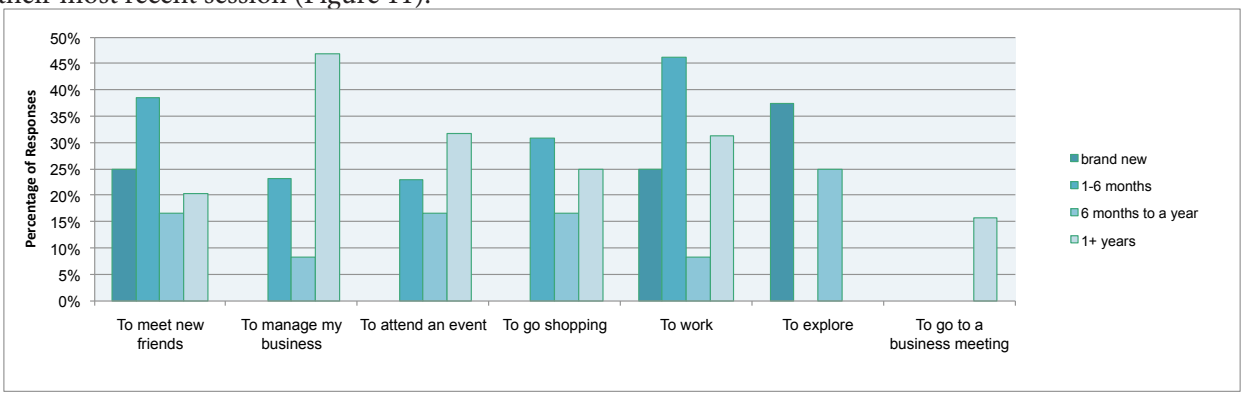

Figure 11 Reasons Residents last logged onto Second Life

Other than brand new users, whom do not have many friends in Second Life, the most common reason Residents went in-world was to hang out with their friends. Because of its overwhelming size, we

discarded this option from Figure 11 in order to view the other responses more clearly. We now can see that brand new users log on to Second Life mainly to explore the environment and to make new friends. New users also work in order to get more Linden Dollars and go shopping for their avatars. Expert users, defined as those who have been using for one or more years, had a different set of reasons to get on Second Life. Other than the previously mentioned desire to hang out with already established friends, at 70%, they also manage businesses and attend events. This change of motivation shows the development of the user's identity over time.

During their first experiences with Second Life, brand new Residents were more involved with exploring the world and discovering activities than with developing their avatar's identity. Many users become discouraged at this stage. However, if they continue into the 1 to 6 month category, which we call new users, Residents start to establish friends and their own identities. Around one year, they mature into Residents with distinct reasons to be in Second Life, motivating them to log on to Second Life more frequently.

We looked at the main activities in which Residents participate in order to determine areas that would help new users find activities and develop their identities. We asked respondents to select all the activities in which they participate in-world (Figure 12).

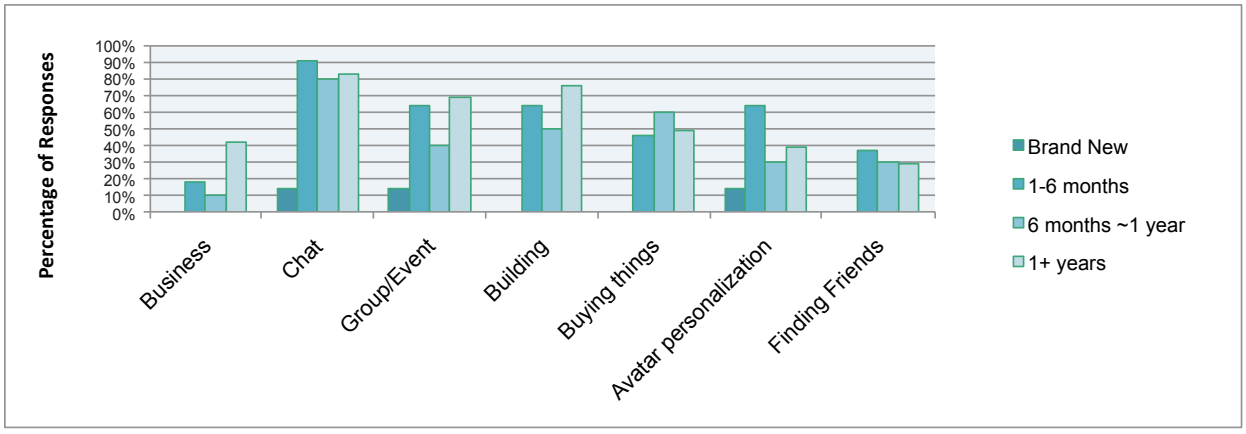

Figure 12 Main Activities in Second Life

From Figure 12, we see that brand new users do not build, suggesting they do not collaborate in projects with other residents, and they are also the least likely to attend groups or events. While brand new and new users responded that they go in-world to find new friends, they do not spend much time on this activity itself, with no new respondents citing this and being the second to last popular activity amongst brand new users. However 1-6 month users do not mind chatting with strangers, (Fig 13 on the following page) and this occurs most often when the strangers are near them (Figure 14 on the following page).

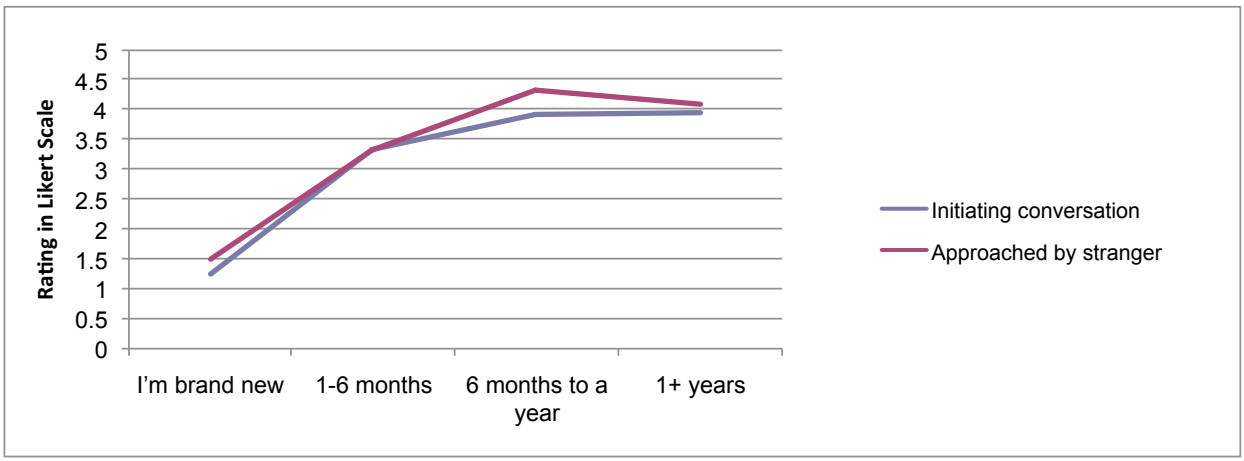

Figure 13 Comfort Talking with Strangers (5-point Likert Scale)

	Being Approached by Strangers				Initiating conversation			
	Brand new	1~6 months	6 months to a year	1+ years	Brand new	1~6 months	6 months to a year	1+ years
The stranger was near me	80%	67%	67%	56%	33%	58%	83%	41%
Interested in Profile	0%	17%	17%	44%	0%	8%	17%	16%
We were part of the same interest group	0%	0%	8%	16%	0%	8%	0%	7%
We were introduced to each other by another resident	0%	8%	0%	11%	0%	8%	0%	13%

Figure 14 How Conversations Start Amongst Strangers

In order to better understand the nature of the relationships amongst Residents and how it is effected by experience, we inquired about the means of communication between Residents (Figure 15).

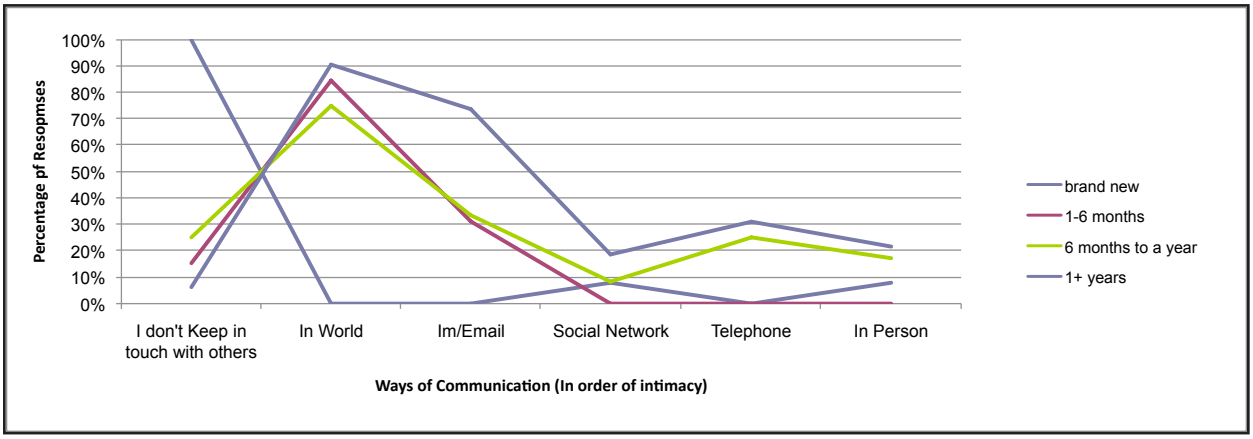

Figure 15 Communication Means Amongst Residents

Most Residents were less comfortable communicating outside of Second Life than communicating in-world. Only those who had been Residents for more than a year contacted other Residents with external IM or email clients. The rest of the respondents kept their interaction inside Second Life, with in-world IM being the most popular form of communication (Figure 15). However, brand new users were not comfortable with keeping in touch with other Residents in general. We then looked into the types of information Residents are willing to make public. In order to get an unbiased response, we inquired as to the nature of personal information users placed in their profile (Figures 16 and 17 on the following page).

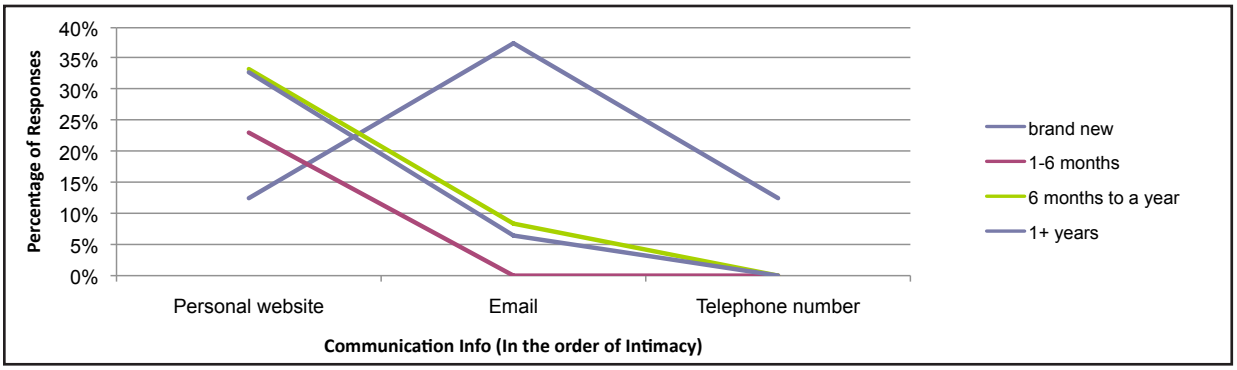

Figure 16 Contact Information in SL Profiles

Residents were not very comfortable with adding their contact information in their profile, but brand new users do add their email address. Yet by 1-6 months, such openness quickly disappears (Figure 16).

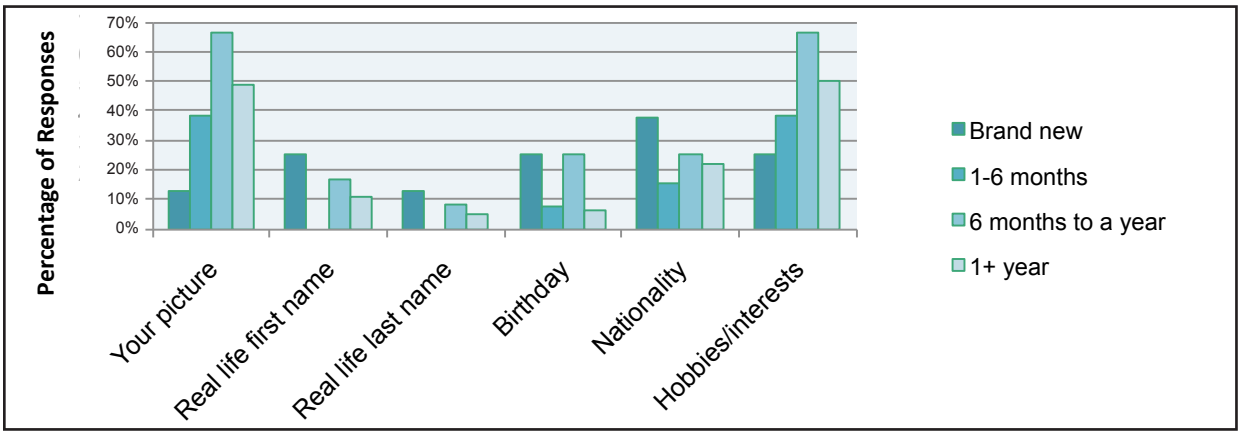

Figure17 Personal Information in SL Profiles

Rarely do Residents include their real life name on their profile (Figure 17). We infer people find separating their real life identity from the Second Life identity desirsable. Those who use Second Life were three times more likely to have multiple social networking accounts at 17% versus 6% of non-SL users, and 57% of these Residents had accounts for their avatars.

We then endeavoured to determine what kinds of events Residents attended in Second Life (Figure 18 on the following page) and how they learned about new events (Figure 19 on the following page).

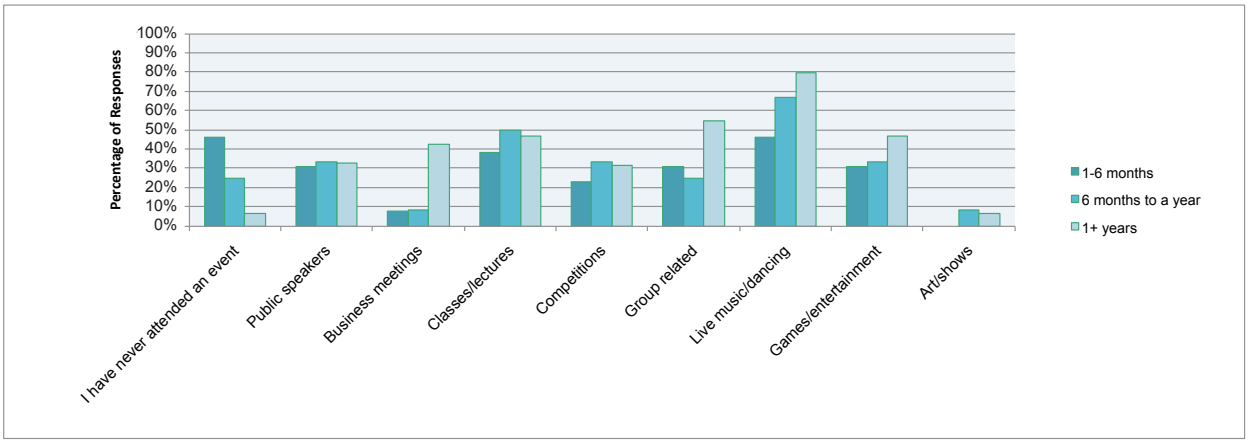

Figure 18 Types of Events Attended

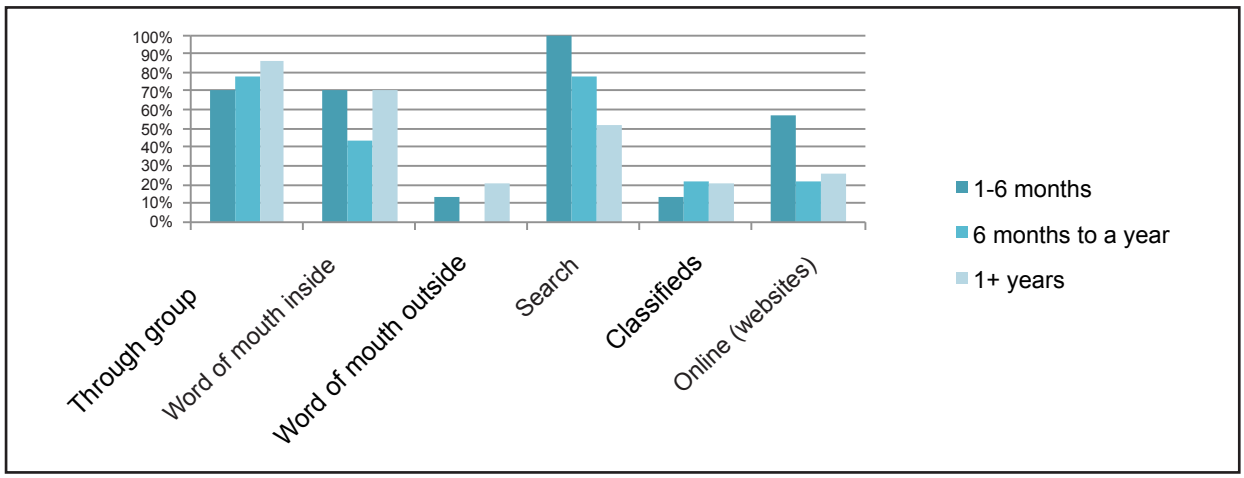

Figure 19 How people hear about Events

While the most popular categories were chatting and making friends, Second Life Residents enjoyed attending events as well, as seen previously in Figure 12. Yet those who had been using Second Life less than one month said that they had never attended an event, and nearly half the people who had been using Second Life less than half a year also said they had never attended an event (Figure 18). Of the people who had been to events, music and dancing were a big attraction, as were classes and lectures, especially those about building (Figure 18). When asked how they find these events (Figure 19), responses varied depending on their experience length in Second Life. People with less experience in Second Life used the Search function as their main tool for finding events, but people with a year or more experience mainly used groups they have joined and word of mouth.

Being that those who had been Residents for an extended period of time preferred groups as a good source of event information, we then looked to see how easy it was for Residents to find groups (Figure 20 on the following) and how valuable they feel these groups to be (Figure 21 on the following page).

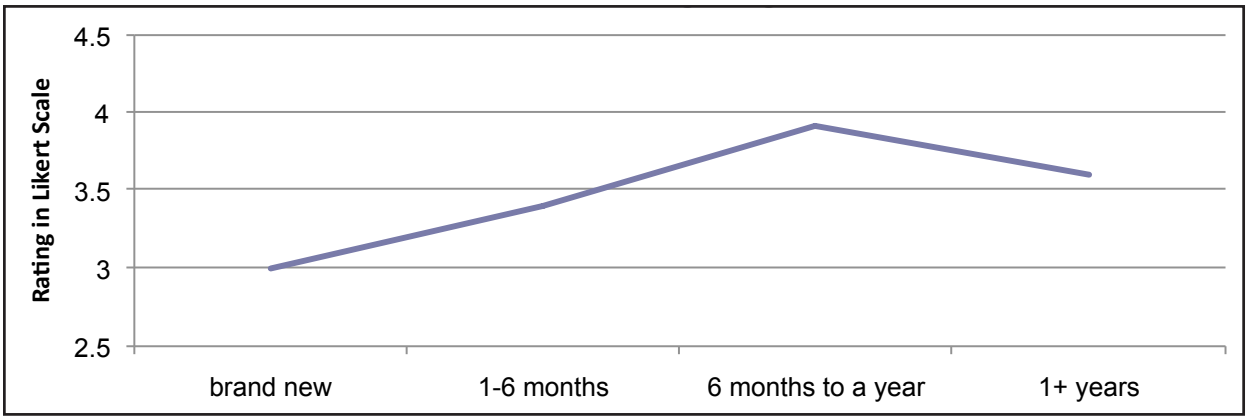

Figure 20 Ease of Finding a Group

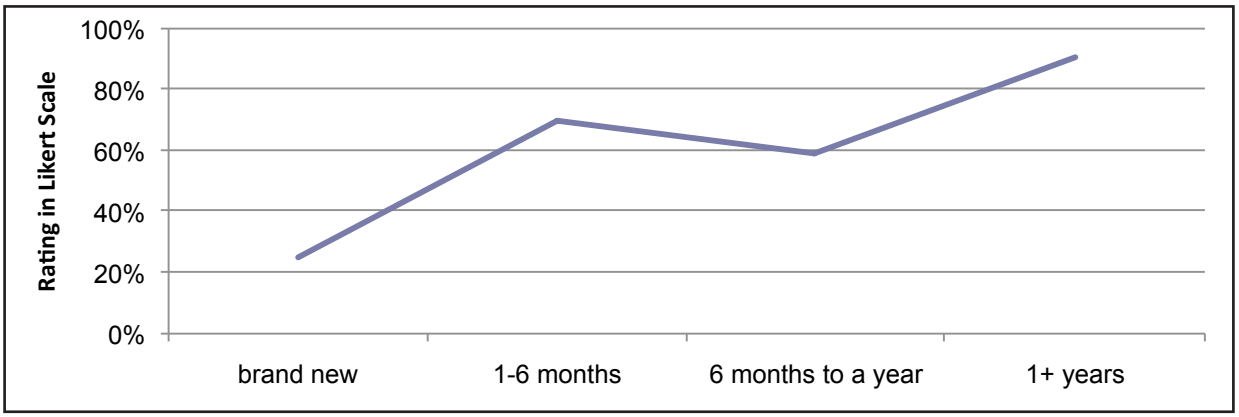

Figure 21 Group Benefit

These graphs show that new users do not find it easy to discover a group that interests them (Figure 20), nor do they find it beneficial (Figure 21). Also in Figure 20, we see that finding an interesting group is more difficult for experts than for some of the less experienced Residents. We pursued an explanation in our interviews, detailed in section 4.3.

4.2.2 Survey Conclusions

While our survey provided a vast amount of information, we merited some findings to be more important than others. First, brand new and new users are interested in finding friends in-world, yet they do not spend much time on this activity. They also do not go to events, nor do they find groups easily or even see groups as valuable. These users rely mostly on the search feature to locate activities, while more experienced Residents use groups and word of mouth. There is an opportunity to show new users the value of Second Life by connecting them with the community around them and the best way to do this is to introduce them to events and groups that interest them. Due to their popularity, events involving music might be a good start.

The survey also shows us how important a Resident's anonymity is to them for most of their Second Life experience. We can infer that even expert Residents whom now contact their Second Life friends in real life went through a period where they would not have been comfortable doing so. We see this

trend again in the lack of real life contact information in Second Life profiles and many Residents' use of social networking accounts for their avatars. This suggests some form of an in-world social network would be a well suited solution and this network should offer various levels of access, allowing Residents to select whom, if anyone, can see their personal information. This survey reminds us to consider Second Life-specific information that will be shared on this network, such as group membership, and to plan accordingly.

4.3 Interviews

Interviews are similar to surveys in that each session is directed by a set of questions. The difference is the researcher is present at an interview and can ask complex questions about the user's thought process and motivation. Due to this aspect, interview questions often focus on the users' opinions and reasoning regarding their experiences. The researcher conducting the interview will often ask the users follow-up questions that delve deeper into their thought process. An advantage of conducting an interview is it provides a lot of information, like a Contextual Inquiry, but is not as time-consuming. The disadvantages lie in the need for the researcher to be careful not to ask questions that may bias the user, and the judgment as to whether or not the user provided enough insight into his or her thought process is subjective and can vary from researcher to researcher.

We focused our interviews on those users who have left Second Life. Our interviews were designed to explore the opinions and details of the specific experiences that the survey could not reveal due to its set question and answer format. We interviewed two expert users and two novice users. We covered topics that concerned users' opinions about Second Life, other virtual worlds, and social networking services, their concerns and experiences with privacy and social management, their feelings toward activities, their learning experience in Second Life, what they have trouble with, if and how they figured it out, and, of course, their reasons for leaving Second Life. These inquiries were followed up with solicitations for anecdotal evidence to help us better comprehend the context. These interviews helped us gain a deeper level of understanding of what we found from the Contextual Inquiries and surveys, thus strengthening our findings and clarifying any misunderstandings or erroneous assumptions we may have had, helping us to confidently apply our data from the user studies into our upcoming design.

The issues of trust and friendship were explored in the interviews. Upon first meeting another resident, the participants looked to the appearance of the avatar, his or her behavior and activities, along with the general chemistry of the conversation, particularly sense of humor, when judging if someone was trustworthy. The expert users mentioned that they enjoyed the reputation system before it was removed; the novices said that the number of mutual connections was important. All those interviewed found collaboration with and receiving help from other users to be effective ways to build trust with another Resident.

The experts stayed informed about their interests in Second Life primarily through groups, using them to interact with other users, handle their businesses, etc. When asked why they were less reliant upon the Search feature, they explained that Second Life has become overgrown and the amount of content is too overwhelming, making locating a group of interest more difficult than it was in their earlier experiences.

The novice users had difficulty accessing groups, mainly because they were still overwhelmed with the fundamentals of the interface. They also had difficulty locating events and new people, which may have

aided them in joining groups. While the novice users found Second Life to be rich in content, they also found it to be too large and experienced difficulty in finding activities and people in which they were interested.

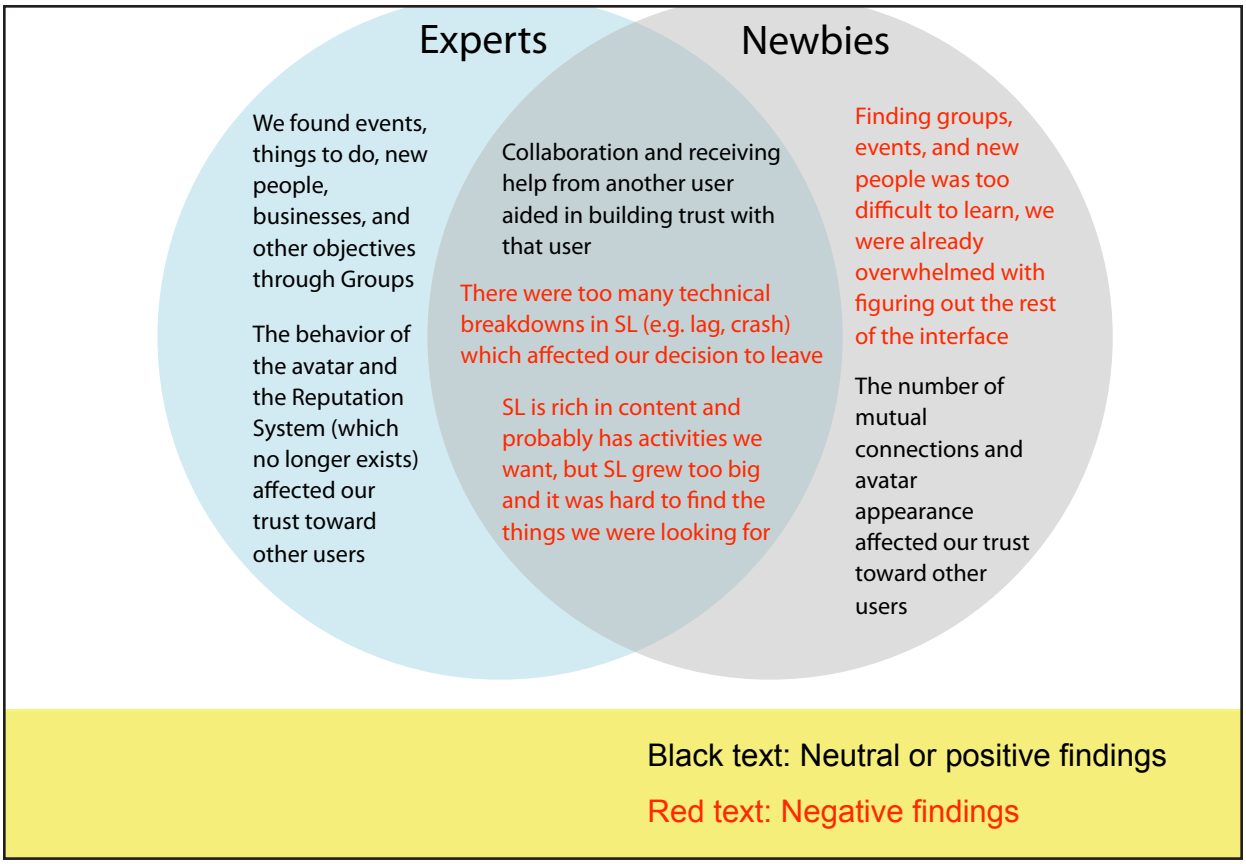

Figure 22 Venn Diagram of Interview Responses, positive or neutral in black, negative in red

As shown in Figure 22, all of the ex-Residents interviewed sited technical difficulties as a main factor in their decisions to leave Second Life. The new users were first confused then frustrated when the system froze or lagged. The experts also were bothered by lag but they sited the slow rez speed, theorizing that the massive influx of new content exceeded the system's ability to catch up. Experts also said they left because Second Life had grown too big. One had a real life job that caused him to no longer have the time or the need to generate revenue in Second Life. In addition, two of those interviewed, an expert and a novice, said they might have stayed had they found some of their real life friends on Second Life.

In Figure 22 we can also see the resources used by experts, the paired need of those resources in novices, and some shared complaints. Experts used forums and groups for assistance when they needed help with something in-world. They also used groups to manage their business, meet new friends and find new and interesting things to do. The novice users said they felt they were offered very little guidance when they entered Second Life, wishing that the guidance stayed with them after they left Help Island. They had great difficulty navigating the options in Second Life and utilizing all the tools available to them, suggesting that bridging this gap is one of the keys in growing from a novice to an expert, with one novice specifically requesting "Find new people" and "Find places" buttons.

From these interviews, we see how groups, events and friends are an important aspect to enjoying

Second Life. We have seen from the survey that experts rely on relationships to learn about new events, yet new users do not have many in-world friends. The interviews show how important mutual connections are to new users, which is also supported from the social networking section of the survey which showed that the number one factor in deciding whether or not to accept a friend request is the number of mutual friends. Perhaps a new user would be able to expand their circle of friends more quickly if they were able to peruse the friends lists of the few Residents they do know. However, since both experts and novices are already lost in the enormity of Second Life a better way to navigate and filter this vast content is also necessary.

The interviews also revealed the difficulties ahead in balancing users' desires for Second Life. Eliminating the technical issues of lagging, crashing, and slow rez speed is outside of the scope of this project. However, informing new users that the world does take some time to reveal itself would help make the experience less confusing. In addition, if possible, notifying the users that Second Life is slowing or frozen would at least alleviate any confusion this experience incurs since often a user's default reaction is to blame themselves. Another issue is the paradox between wanting to locate real life friends and wishing to remain anonymous in-world. This issue will require careful and considerate design, with follow-up user testing, to ensure that we develop a solution that is palatable to most Residents.

4.4 Explanation of CI Models

Based on the data collected from Contextual Inquiry, models of the study are created to represent key aspects of the work that design teams need to account for in their redesign. These models are built from the inquirer's perspective and are not intended to represent everything the participant may do. In addition, modeling is completed within 48 hours to insure the details are fresh within the modeler's mind. In our Contextual Inquiries to date, we have created flow models, cultural models, and sequence models and their consolidated counterparts, found in Appendixes D-K.

4.4.1 Contextual Design

The process of Contextual Design (CD) is comprised of two parts: Contextual Inquiry (CI) and work modeling. Contextual Inquiry is a user study protocol in which the researcher observes the participant working in his or her natural environment, occasionally asking clarifying questions about why the participant performed certain actions in order to understand his or her motivation. Contextual Inquiries usually require one to two hours per participant.

After conducting CIs, models are created from the data to provide a uniform way to analyze the various users. Formally, there are five types of models: cultural, workflow, sequence, artifact, and physical. Cultural models indicate the social and cultural ideas that influence and are impacted by the user and those around him or her. Workflow models show the people and processes involved in all of the user's actions. Sequence models document the step-by-step performance of each task, while artifact models examine the benefits and shortcomings of the tools used for those tasks. A physical model illustrates the physical environment in which work occurs. We determined that artifact and physical models were not appropriate for our subject matter. In all the models, aspects that obstruct or delay the completion of a goal are marked as breakdowns. The breakdowns indicate issues that need to be addressed when redesigning the product. The construction of models for each participant takes several hours.

After the models are constructed for each user, each type of model will be consolidated across all users of the same type, so that common breakdowns are apparent. This process can take anywhere from several hours to a few days, depending on the number of users.

4.4.2 Workflow Model

The workflow model, or just flow model, represents the distribution of responsibilities across different people and the communication between them. The goal of creating a workflow model is to identify communication patterns, sound work practices to incorporate into a system, and problems to eliminate. The following paragraph lists and explains a workflow's components and how each is represented.

Individuals can be a person or a group with responsibilities. Each individual is drawn as a circle. Responsibilities are a set of responsibilities pertaining to an individual. They are placed within each individual's circle. Groups represent individuals who have a common goal or cooperate together. Each group is drawn as a circle. Flow represents communication between entities to accomplish a task. Each flow is drawn as arrows between the entities. Artifacts are objects that may be passed around or manipulated. Examples include documents, email, etc. An artifact is drawn as a small box on a flow. Communication topics or actions give more detail to a flow. Communication is written on a flow without a box. Places are where people may work, coordinate, and/or collaborate to accomplish a task. A place is drawn as a large box with the name of the place and its responsibilities. Breakdowns represent problems in communication or coordination. A breakdown is drawn as a red lightening bolt.

4.4.3 Sequence Model

A sequence model represents steps required to accomplish a task, the initial trigger to this set of steps, and intents that are accomplished. The order of the steps may reveal strategy or patterns of work, and it also provides a road map to see whether the transitions are smooth and if any steps can be combined or skipped. Breakdowns are problems that occur in the set of steps and are drawn as red lightening bolts.

4.4.4 Cultural Model

The purpose of a cultural model is to capture and map the cultural context of the user. Cultural context is the mindset that people operate within and effects of people's actions; it may include formal/informal policy of an organization, corporate culture, self-image of the people doing work, feelings and fears between people, and more. Even though culture is something invisible, the cultural model provides a tangible representation. Rather than representing the status of an entity, this model will show how his or her power is experienced by other people. The following paragraph lists and explains a cultural model's components and how each is represented.

Influencers are individuals or groups who affect one's work. Influencers may also be overall culture in the organization or among people doing the work. They may be internal or external to the organization. Influencers are drawn as circles. The extent of the effect on work is proportional to the amount of overlap between bubbles. For example, work may be affected completely or partially by another entity and this is represented by the amount of overlap. Influence on the work is represented by labeled arrows: The direction of influence, or who influences who, is indicated by an arrow's direction. Pushback is also represented. Breakdowns are problems that are interferences in the work. A breakdown is drawn as a red

lightening bolt. In the cultural model, these breakdowns are especially harmful.

4.5 CIs of Social Networking Experts

We have conducted Contextual Inquiries with two social networking experts. An expert is defined as a person who uses multiple social network services actively. By studying this user type, we hope to reveal how people use social networks to shape their virtual identity, how they manage their friends across different social networks, and what is attractive about additional social networks.

Our user studies took place in our lab. We requested each participant to log on to his or her social networks and do what he or she normally would if we were not present. The participant was encouraged to think aloud during the study. The data from this study, gathered through video and screen capture, was used to make workflow models, cultural models, and sequence models within 48 hours of each session.

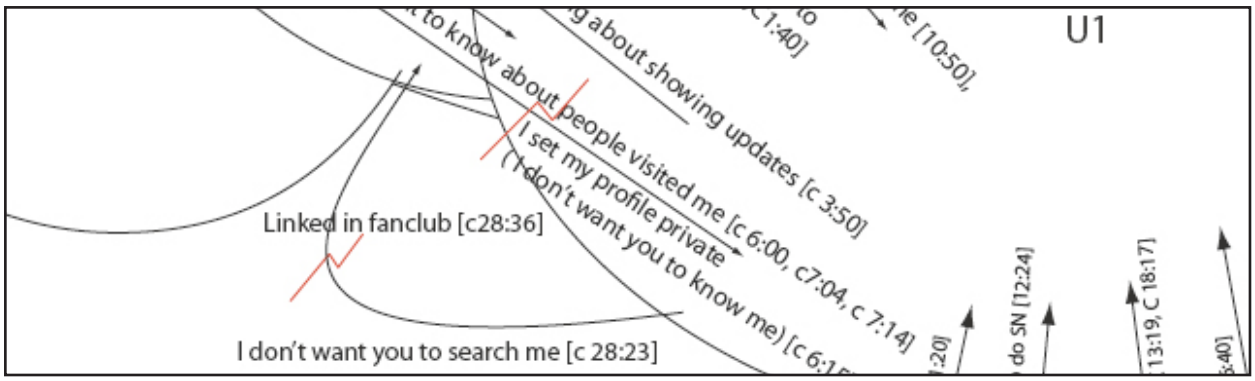

Figure 23. Selection of User 1 Cultural Model (full model available in Appendix D)

Our first participant, User 1, (partial model in Figure 23, full models available in Appendix D) has many privacy concerns. User 1 is very hesitant in posting sensitive information on his or her profile; on one of the accounts, User 1 even replaced his or her name with a series of non-meaningful characters to remain as anonymous as possible. User 1 also noted that many contacts used "friending" as a way to increase their network; by becoming a friend of User 1, they gained access to a larger friend network. Finally, User 1 mentioned how distracting and annoying third-party applications, in this case, applications in Facebook, can be, sending notifications about various updates about which User 1 did not care. User 1 used multiple social networks, because they served different user bases and purposes. In some cases, the networks differed by the various communities using them, and in others, the line was drawn between professional and casual.

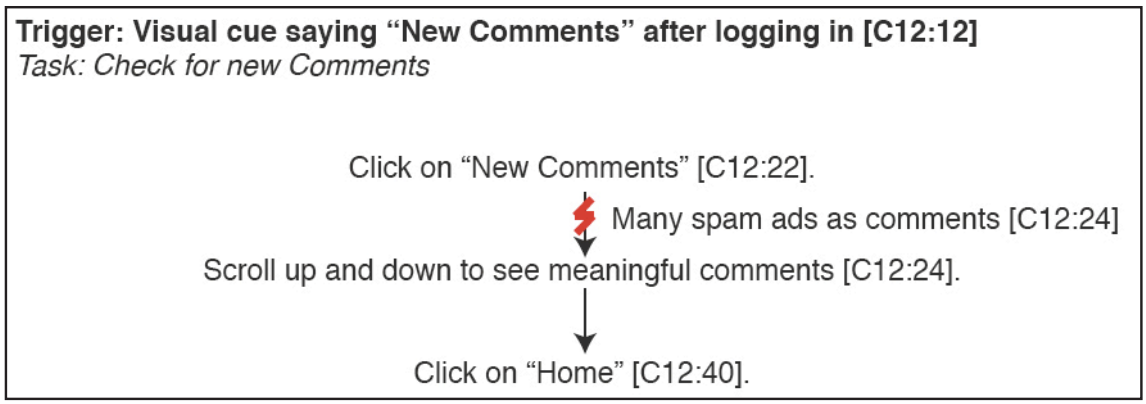

Figure 24. A sequence Model from User 2. (all models available in Appendix E)

Our second participant, User 2, (full models available in Appendix E) was almost the opposite from User 1 when it came to privacy issues. User 2 was initially very open about posting personal information, such as a phone number, on his or her profile. However, User 2 removed sensitive information when confronted with a privacy problem. Like User 1, User 2 also used multiple social networks; the nature and user base of each social network influenced User 2's use. An overwhelming amount of spam and advertisements in one of User 2's social networks deterred the user (seen in partial sequence model in Figure 24), resulting in a decrease of usage of that social network. When browsing through updates of friends, User 2 looked at photo updates rather than text-based updates.

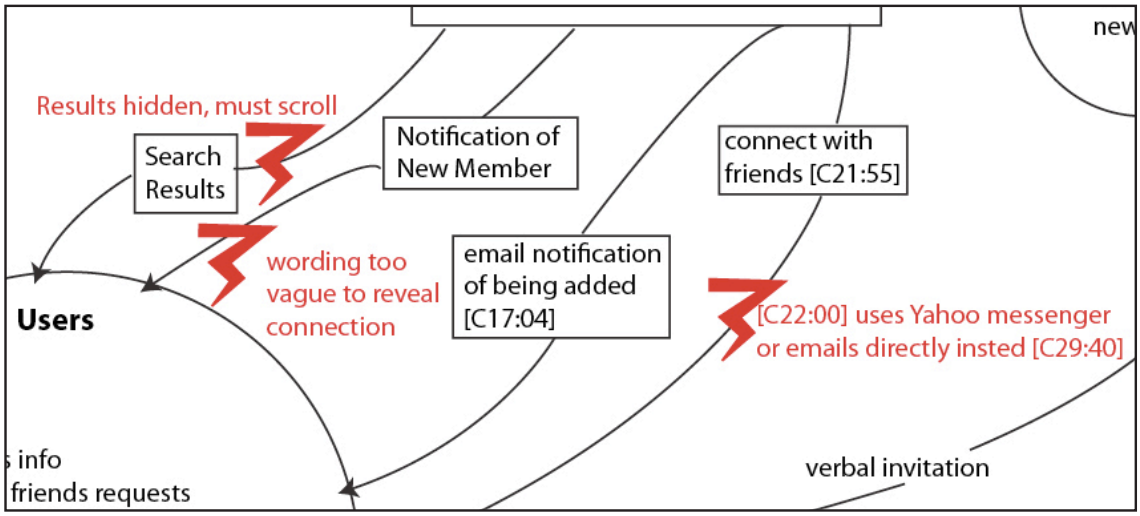

Figure 25 Section of Consolidated Flow Model (full model available in Appendix F)

We combined the two users' experiences and preferences into a consolidated cultural model, consolidated workflow model, and consolidated sequence model (partial workflow model in Figure 25, full models available in Appendix F). Some of the breakdowns in the consolidated cultural model concern strangers on the social networking community reaching out to the user for benefits, the user not trusting the community with personal information, and weak connections in the social network making the user feel like the value of the friendships were declining. Since our two users were quite different, and all breakdowns must be included in consolidation, our consolidated cultural model contains mainly

breakdowns. On the other hand, our consolidated workflow model had a greater amount of overlap among different entities. Many of the artifacts and activities passed related to the different updates of the user, other users, connections, and the community in general. The consolidated sequence model was organized into three main activities: connecting to the social network, checking for updates occurring within the user's community, and casually browsing the network.

These Contextual Inquires serve to highlight key aspects of social networks to include and avoid in our designs. Supported by our literature review, many levels of privacy options will best serve the user. They should be allowed to select who will view their profile as well as who has access to more personal information within that profile. The case of multiple Second Life accounts can be related to multiple social networking accounts, and we infer that each of these will be used for different audiences and purposes. In addition, friend verification is an important step to ensure the integrity of the user's social network, avoiding weak connections that may downgrade such a network's value to the user. Restricting access to the profile and taking steps to verify friends has the added benefit of decreasing the amount of spam the user encounters, benefitting his or her overall experience. Related to this respect, the user should be allowed to determine what, if any, type of notifications they receive outside of the social network. Finally, users enjoy object-centered content as a way to check in with friends, a feature that can be well supported within Second Life.

4.6 CIs of Second Life Experts

We conducted three Contextual Inquiries with four Second Life expert users (models can be found in Appendixes G-J) to learn what motivates users to remain active in Second Life. We defined expert users as those who have been active in Second Life for more than a year and log on daily. Of our four participants, two performed music in Second Life on a regular basis, while the other two reported listening to music and dancing as their primary activities in Second Life. These participants were a reasonable representation of Second Life Residents since the survey respondents also cited musical events as the primary type of events they attend.

Two Contextual Inquiries were conducted in the participants' homes and two were conducted in our lab because of location constraints. Participants were asked to log on to Second Life and do what they normally would do if we were not present. Each session was recorded on video and screen-captured to ensure that we have complete information about what was happening in Second Life as well as the participants' reactions. The recordings aided in the creation of workflow, cultural, and sequence models within 48 hours of each session.

Our first expert user was a singer in Second Life. Her Second Life contacts consisted of her fans, her manager, her real life connections, and other Residents. She was very open to conversing with strangers; as a performer, she was eager for feedback from her fans. She received a great deal of emotional support from these fans, and this was one of the key benefits to her using Second Life. The breakdowns for this user all involved limitations imposed by Second Life. For example, she had to use a script for selling streaming music because each segment of music was limited to be no longer than ten seconds.

Our second expert was a DJ in-world. His Second Life friends consisted of his audience, other performers, and Residents with which he collaborated, along with a collection of other Residents he had encountered. He was also very open to conversing with strangers because he wanted to advertise his

events, but he added contacts sparingly, preferring to use his group list to manage acquaintances. Other than limitations imposed by Second Life, most of the breakdowns for this user involved needing to repeat numerous actions. For example, when he bought the land he is currently renting on from the previous owner, his objects were removed from the land and placed in his Lost-and-Found inventory; the system did not recognize that the previous tenant is the current owner.

Our third and fourth experts were dating in real life and always went in-world together. Their Second Life contacts consisted of their real life connections and other Residents. Dancing to music, chatting with nearby Residents, and shopping were their main in-world activities. The two users often helped and received help from other Residents by sharing knowledge about Second Life with each other and other Residents, something that the first and second expert users did as well. The breakdowns for these experts consisted mostly of technical issues. For example, one of them came in contact with a railing, got stuck, could not move away even after restarting Second Life; the user solved the problem by teleporting to another location. In addition, they had to restart twice because their contact list failed to load.

We consolidated the Workflow and Cultural models for all four experts. Three common themes surfaced across all of the experts' usage of Second Life: their connection to the community, their relationships with Second Life Residents, and their main activities in Second Life, visualized in Figure 26.

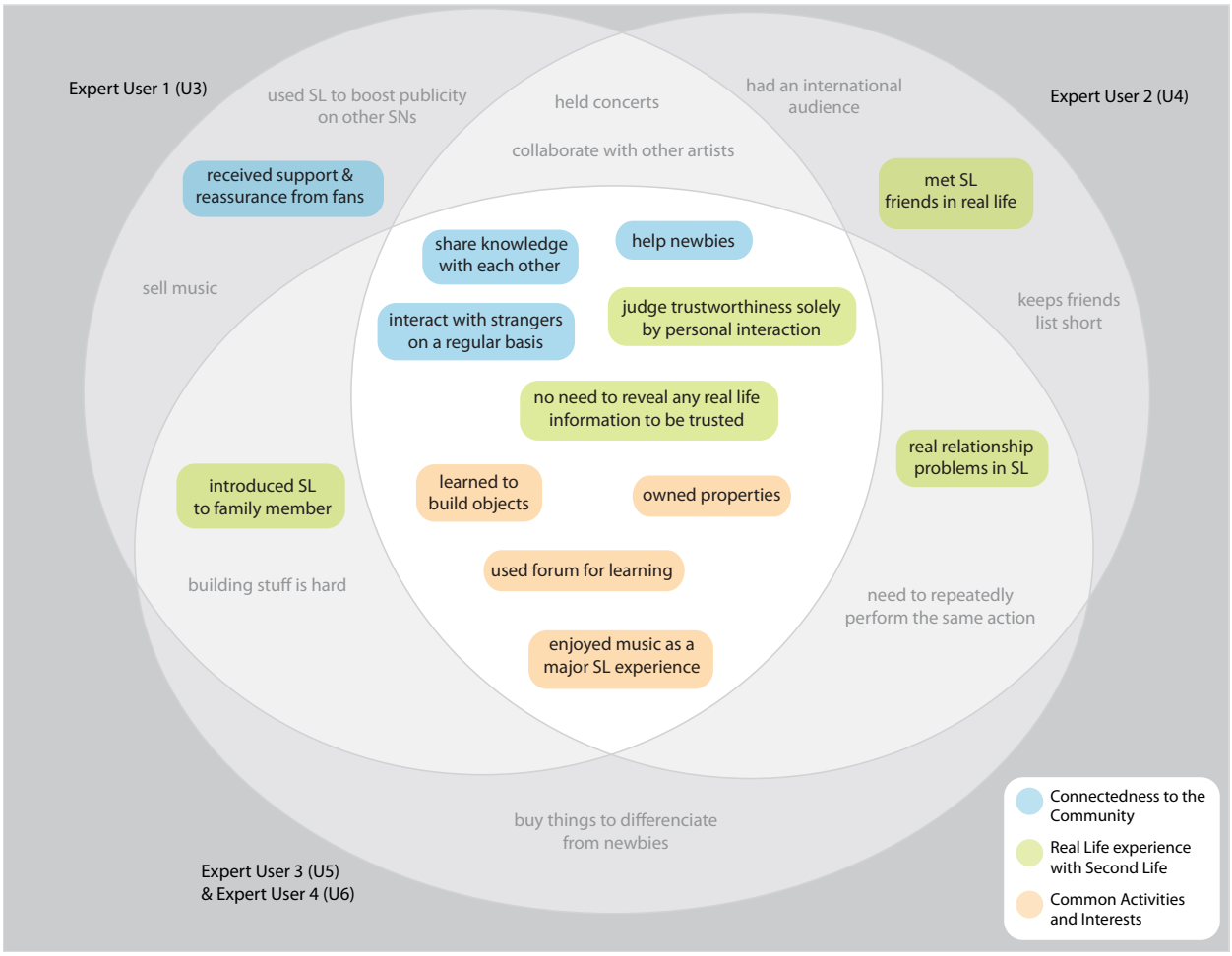

Figure 26 Visualization of SL Expert Consolidated CIs

All of the expert users were well-connected to their surrounding communities. They shared knowledge with their friends and interacted with strangers on a regular basis. The users all cited forums as a valuable learning tool. One of the experts recalled the value of receiving help from a more experienced Resident with whom he was collaborating at the time, suggesting the value of these resources for new users.

Our participants all had real life friends who were also on Second Life, or have interacted with Second Life friends in real life. The participants have also encountered an array of real relationship problems in Second Life, ranging from vandalism to friends who are too dependent. When asked about judging the trustworthiness of strangers they meet in Second Life, the participants cited that they decide solely by how the stranger interacted with them. They said that there is no concrete rule for judging if a Resident is genuine and that a Resident does not need to reveal any real life information to be trusted.

Our participants had various other features in common. As previously mentioned, music was a major part of all the experts' Second Life experiences. All of the participants had owned properties at some point in their Second Life, if not currently, and have learned how to construct objects. They had employed forums as one of the main places they looked for help in learning how to build in Second Life.

These Contextual Inquiries allowed us to observe the types of activities and behavior that will keep a user active in-world. First and foremost, a user must be connected to a community within Second Life. This connection provides not only a source of activities in which to participate, but a resource when learning the ins and outs of both the interface and the world itself, not mention a feeling of friendship and belonging. New users should also be made aware of the resources, outside of friends and groups, upon which these experts rely. Namely, finding useful and appropriate forums should easy for a new user; becoming involved in such an activity as building would provide a good place for new users to meet like minded people. However, novice users can be reluctant to talk to strangers. Providing these users with a way to feel they are accurately appraising the trustworthiness of others will allow them to become more comfortable with interacting with strangers and, in turn, the community as a whole.

4.7 CI of Second Life Novice

We performed a Contextual Inquiry on a novice user by observing her in Second Life. In the one hour we observed, the user encountered as many as fifteen workflow breakdowns in trying to complete her tasks and activities. (These breakdowns are documented in the Flow Model for User 7 in Appendix K.) Of these fifteen breakdowns, twelve were identified as technical breakdowns. In terms of frequency, this averages to about one technical breakdown every five minutes. These breakdowns were things like clicking on the wrong button on the user interface, seeing no names appear in the contact list, and wearing too many pieces of clothing to access her skin. We found that the user simply accepted these issues as part of the Second Life experience. For this user, her benefits to using Second Life outweighed the costs of dealing with these technical issues.

We found that the most significant benefit the user received was being able to maintain a relationship on Second Life and feeling strong emotional support from having this relationship. In paraphrasing the user, she mentioned, "I wouldn't be on Second Life if I didn't find a connection with someone." (This cultural influence is documented in the Cultural Model for User 7 in Appendix K.) In general our user was able to meet a lot of people in Second Life and make several significant connections. Our user also liked being able to live glamorously on Second Life. She dressed up to go to events, and would change into

a different outfit before heading to a new event or location.

Our CI user was different from the Think Aloud users whom we describe in the next section, in that she was able to rely heavily on her real world relationships to help in her Second Life experience. She would very frequently ask her son and daughter-in-law for help in using the system and finding things to do. In fact, her daughter-in-law and son introduced her to Second Life, and had the roles of being tour guides and providing technical assistance. This connection greatly enhanced her experience of Second Life and is something we would like to share with all new users.

Because of the difficulty gaining the trust of novice users in Second Life, we were unable to fulfill our desired quota of three Second Life novice Contextual Inquiries. To supplement our knowledge of new users in Second Life, we conducted three Think Alouds with brand new users within Second Life.

4.8 Think Alouds

Think-aloud usability testing (TA) is the "gold standard" of usability tests. Think Alouds can find new problems or test the validity of predicted problems, and can be performed anywhere, depending on what materials are needed to perform the task(s) being tested. This test may be done early in the design process on an existing system or some task of interest to the design team, or late on a prototype. Most importantly, TA testing gains insights into how users think and act.

In TA testing, the participant is asked to "think aloud" while doing a task. The participant is taught how to think aloud in the proper way. The participant should simply verbalize what he or she is thinking, never explaining it. Psychological studies have shown that the linguistic content of working memory can be verbalized with high fidelity, changing thought process or actions minimally, if at all. Only highly linguistic tasks can be investigated this way, however. Participants cannot explain what they do without affecting how they do it, and the explanations they give are usually inaccurate. Participants also perform better on a task while talking about it, so the data received will be slightly skewed. The data gained from TA only reflects the participants involved in it, so testers should try to involve participants representative of the target population. For these reasons, TA testing must be done carefully and never combined into another method. For example, in Contextual Inquiry, experimenter asks the participant questions, changing how he or she thinks and performs.

As long as these pit-falls are avoided, TA testing gives highly valuable and valid qualitative data. TA testing gives insight not only into how users go about doing a task but also whether they find a task easy or hard, what they like or do not like, what frustrates them, etc.

Whether or not something is a problem often comes down to the tester's judgment. To combat this subjectivity, the testers decide on criteria for "critical incidents" before running the user tests. This way a standard is devised to decide whether or not something is an important event in the user test.

We performed Think Aloud studies with three new Second Life users. We created general avatars for use and gave users three tasks:

1. Find an activity in which to participate (other than avatar customization)
2. Find an event that interests you
3. Find a specific avatar in-world (with avatar name given)

For the third task, a second researcher waited in-world until their avatar was contacted by the new user. Each user was instructed to speak their thought process aloud and was observed for 35-45 minutes.

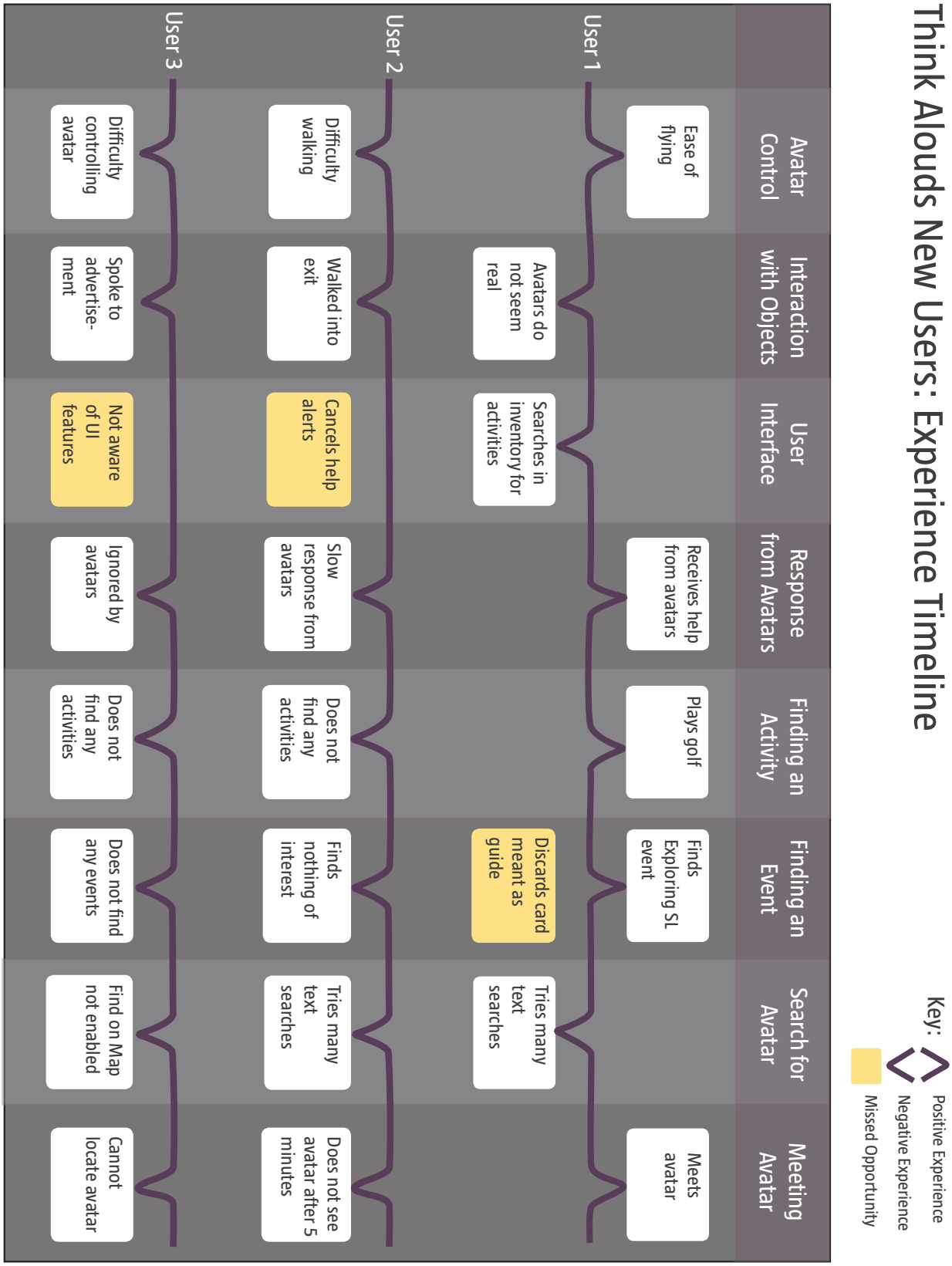

Figure 27 Visualization of User Experience in Think Aloud Study

In order to interact with the environment, the users first experimented with how to navigate the avatar. Two users experienced difficulties controlling and moving the avatar. User 2 spent a lot of time trying to learn how to walk around, attempting various features on the user interface to determine how to move, eventually expressing frustration (JJ-TA-10). User 3 also found it difficult to control the avatar but recovered quickly (KA-TA-6). User 1 learned how to fly easily (EJR-TA-4).

Users next tried to interact with objects in-world. The appearance of objects did not give enough visual cues as to their appropriate usage however, and all three users had difficulty distinguishing that with which they could and could not interact. User 2 tried to walk into the exit of a building (JJ-TA-4) and the User 3 tried to talk to an inanimate object (KA-TA-2), in this case an advertisement. User 1 did not immediately realize he could talk to the other avatars and expressed that the people did not seem real (EJR-TA-8). User 1 attempted to perform a search for an activity in his inventory, and did not realize until after three to four attempts that the box was labeled as Inventory (EJR-TA-2). User 2 also discarded note cards and alerts that popped up on the screen that were meant to help explain what to do, likely seeing the alerts as spam (JJ-TA-5).

After exploring the world around them, the users generally began investigating the Second Life user interface in order to find an activity. Users had to take time to explore the options at hand, such as their inventory and the bulletin board. However, User 3 continued to look for cues in-world, and eventually became so frustrated that he clicked on a demo skin and said that was his activity (KA-TA-2). User 2 spent an extensive amount of time investigating the interface but was so overwhelmed by its complexity that she exceded the time limit for the task (JJ-TA-3). User 1 was successful in the first task, being able to locate a golf island where he then spoke with local avatars to learn how to play golf (EJR-TA-6, EJR-TA-7).

All users experienced some difficulties in finding an event. User 2 performed initial searches clicking the Search feature and the Events tab, and was confused as to why there were no listings displayed there as they had yet to enter a query (JJ-TA-7). She searched under the All tab and was further confused when the search results yielded locations instead of the events themselves (JJ-TA-6). As a consequence she never found anything of interest. User 3 spent much time only exploring the island and environment around him for things to do. He did not find any events within five minutes and became frustrated (KA-TA-3). User 1 successfully found an event (EJR-TA-9), but he discarded the note card which was meant to provide guidance (EJR-TA-10). He was further distracted by the advertisements around the event location distracted him from seeing the box which would teleport him to the location.

Searching for other avatars was often difficult. In completing the task of trying to find a given avatar in-world, User 2 did not succeed within three minutes (JJ-TA-8) and User 3 had to try more than five things to accomplish the task (KA-TA-4). Each user had to find a different avatar name, and the initial name searches did not yield any results and the users had to try various text searches. After locating and using the Search feature, User 1 eventually had to scroll through a long list of names to find the avatar name given (EJR-TA-11).

Once users had contacted the avatars, they tried to find them in-world. After teleporting the avatar or themselves to the same location, two users completely missed the other avatar, not realizizing they were next to or behind them. User 2 successfully teleported the avatar to her location, but spent five minutes trying to find the avatar who was standing directly behind her in crowded Help Island. She expressed confusion in not being able to connect with the other avatar immediately after teleporting her (JJ-TA-9).

User 3 walked right by the bar where he was to meet the avatar, not realizing that was the location he was looking for. He could not find the other avatar even with more information from that Resident (KA-TA-4).

At points in the study, all users made attempts to speak with other avatars for assistance. The reactions from other avatars affected their experience in Second Life. For Users 2 and 3, the other avatars did not respond or took too long to respond (KA-TA-7). After User 3 was ignored by a group of avatars, he expressed frustration with the Second Life experience. User 1 was able to successfully obtain help from other avatars in learning how to play golf, which contributed positively to his experience (EJR-TA-7).

We did not observe any of the three users encountering trust issues with other avatars, or hesitate in interacting with other avatars. We attributed this to the fact that the users were using a general avatar we provided to them. We hypothesize that because the avatars our participants were using did not represent themselves personally, they were bolder in approaching other avatars and interacting with others.

In the roughly 40 minutes we spent observing each user, we found that two out of three users did not get very far finding things to do in Second Life. This was due to various reasons. Much of their time was spent trying to learn the interface and features available at hand, and becoming familiarized with objects in the world. User 3 also only looked to the environment around him as the scope of the virtual world. He did not consider other options such as teleporting or searching because he was not aware that these features were available to him. We also observed many occasions where users tried multiple times to complete a task, and ultimately performed the task in a suboptimal way or were unsuccessful, like expecting to find places of interest in the search and events features, and expecting to easily connect with avatars in-world. Often times the actual result of their actions was somewhat of a disappointment or different from what they expected, resulting in frustration for the users. For Users 2 and 3, their experiences were often negative or neutral at best. Only User 1 found some personal connections and positive experiences while in-world, expressing interest to explore Second Life further.

The breakdowns encountered by new users inhibited them from easily exploring, finding things to do, and making a connection to their real lives. Since they could not find things or people which actually sparked their interest, Users 2 and 3 felt it was not worthwhile to continue to deal with these frustrating experiences. In the time given, these users did not reach a level of expertise where they were able to participate in the activities which experienced users find worthwhile, such as meeting people, building things, going to events, etc.

For User 1, the slow rendering made things which seem obvious difficult. The user flew into a building because it had not completed rezzing, so it appeared that nothing was in front of him. As observed by the researcher, "after trying and failing to fly into the building, the user figures they are not interested enough to enter the building and flies away from the building." This particular experience is symbolic of the Second Life new user experience we observed. After running into unexpected roadblocks in exploring the world, users cannot see the value inside the world, similar to not being able to see inside the building. They decide there is not enough interest for them personally to pursue Second Life and "fly away".

The Think Alouds allowed us to see an unbiased view of how new users experience Second Life. Understandably, the richness of the content also makes understanding how to operate within it difficult. New users struggle with the smallest of actions, such as controlling the avatar, and this struggle continues into their attempts to explore the world. Once they understand who is real and who is not, that not

everything rezzes at once and they can walk with the arrow keys, they need to first recognize and then decipher the user interface. Even once they identify the correct feature to aid them in their intentions, they must further learn how this feature operates, which is often in contrast to what they expect. However, interacting with other Residents can save their experience, offering them guidance and making them feel more comfortable. Only the user who seemed to grasp the 'idea' of Second Life enjoyed himself and expressed a desire to further explore the world. This experience is a model for how we will want all new user experiences to be.

5. Conclusion

We have completed the research phase of our project and will soon be moving on to design ideas. Before we embark on this next phase, we find it important to distill the implications of our research. In the following paragraphs, we will explain our findings within the context of our foci, illuminating the areas that merit improvement and fall within our scope.

5.1 What do I do now?

Becoming lost in the complexities of Second Life is a problem shared amongst all users. From our Think Alouds, survey and interviews we observed that new users often have no idea what they can do in Second Life or where to find it. This problem is compounded with difficulties with the user interface. Yet the confusion has spread to the more seasoned Residents as well; these Residents feel that Second Life has grown past their ability to navigate easily. Experienced users have migrated away from the Search feature and rely more heavily on their groups and friends to locate new things to do, but new residents often have neither and rely heavily on the search feature. This means that the first time a new Resident asks, "What do I do now?" they look to the Search feature for the answer.

The Search feature proved to be problematic in several respects. During their first encounter, new users were unsure what the tabs meant and received no explanation when they investigated because the tabs are initially blank. In addition, when searching in the 'All' tab, the results came up mixed, sometimes yielding places or people, groups or classifieds, further confusing new users. Experienced users distrust the ranking the search feature employs, knowing that it is based largely on traffic, which can easily be manipulated with campers, which are Residents who are paid to hang out at one location. This issue of trust extends to our next focus.

5.2 How do I socialize with people in virtual communities?

The first obstacle to overcome when socializing with new people is the issue of trust. We discovered that Residents make judgment calls much like they would in real life, based on subtle cues such as demeanor and more overt cues such as actions. We also know that new users like to make these calls based on mutual connections between themselves and the other person, since they are more cautious in initial interaction with avatars. However, mutual connections, which imply a collection of in-world friends, are not available at first to most users so some other system must be in place to allow them to feel more comfortable with their assessments of other Residents.

We have seen that collaboration builds deeper trust in Second Life relationships. The experts to which

we spoke had anecdotes about how a more experienced user helped them in some way and how this interaction not only deepened their trust in that Resident but increased their enjoyment of Second Life. Yet new users do not tend to build objects or attend events. One would reason that the best way to get new users to collaborate with, and therefore trust, other Residents is by placing them in a social situation that is conducive to such activities. While real life connections, whether through work, family or friends can give users compelling reasons to be in Second Life and should be encouraged, a gathering of like minded individuals can give equal motivation to remain in-world.

5.3 How do I shape my identity/identities in virtual communities?

A Resident's identity is central not only to their experience of Second Life, but in how other Residents experience that person. We know that new Residents do not spend much time shopping or attending events but they are interested in editing their appearance, in essence changing the face they present to the community. The concept of the face a user presents can be extended to an avatar's activities and interests. We have seen that it is a Resident's mannerisms and actions upon which they are judged.

Shared interests often lead users to groups. They can find them by being in the same place, being on the same forum, attending the same event, searching, or simply talking to someone about what they enjoy. We argue that these interests and their resulting group affiliations shape an avatar's identity, or, if they are unsure who they are in Second Life, can aid them in their development.

The profile is another way to determine what a Resident is about. Within these profiles we see everything from snapshots of avatars to favorite places, lists of friends and projects worked on; we see their birthday, nationality, hobbies, perhaps even a personal website. But we often do not see real life names or emails. It is this distinction that allows many users to develop their avatar into who they want to be in Second Life, be it an expression of someone part of themselves they cannot show in real life or an ideal projection of themselves. Protecting this freedom of expression is paramount.

The practice of keeping a Resident's real life identity anonymous by no means indicates social behavior and sharing is not prevalent in Second Life. People have spent a lot of time sculpting their second self into something that's meaningful for them and are eager to share. We saw many instances of collaboration and shared insights amongst users. We, as Residents, have experienced the willingness of other Residents to share favorite locations and activities. We also have observed the placement of avatar snapshots in Residents' profiles. This openness and sharing of users' experiences and not necessarily their identities supports an object-centric social network that shares the artifacts of Residents' second lives.

5.4 Closing

Throughout this research we have seen a recurring pattern: A need of new users and a paired offering of the community. New users come into Second Life alone, awkward, and lost. The vast majority have no friends from real life when they first sign up and are timid talking to other Residents. They have great difficulty not only with the interface but in utilizing the many ways to participate in the world around them, be it building, scripting, or simply applying pre-made animations. They fail to grasp what is available in this rich community and are handicapped in their explorations.

Second Life has all of the missing pieces to the new user's puzzlement. Rich communities embrace any aspect of Second Life imaginable, even the task of acclimating to Second Life. Residents have made forums

devoted to becoming acclimated, learning how to build, how to script, how to run a successful business, or even how to best explode virtual bombs. Residents have created a dazzling array of activities and locations, accessories and animations. The means users need to express themselves through their avatar are all held within Second Life.

All the pieces of a grand Second Life are within the world waiting to be discovered, but new users repeatedly fail to find them. Those Residents who do not make it past their tenth log in never see the breadth of the community and all it has to offer. This very connection, this bridge to the community and indeed a whole world needs to be brought to new users.

6. Next Steps

Over the next three months, our team will be determining the design implications of our research. From these implications, we will derive possible solutions. This list will be distilled to the most needed changes, the most user-friendly, and the most feasible. We will then implement a prototype which will be user tested. Some of the techniques we may employ include Think Alouds, Keystroke Level Modeling, Heuristic Evaluation, and Cognitive Walkthroughs. Taking the lessons learned from this testing, we will then modify our design and its prototype. This new prototype will undergo more user testing, allowing us to refine the design further. If time allows, we will attempt to get through this iterative process a third time. Finally we will present our design solution in August.

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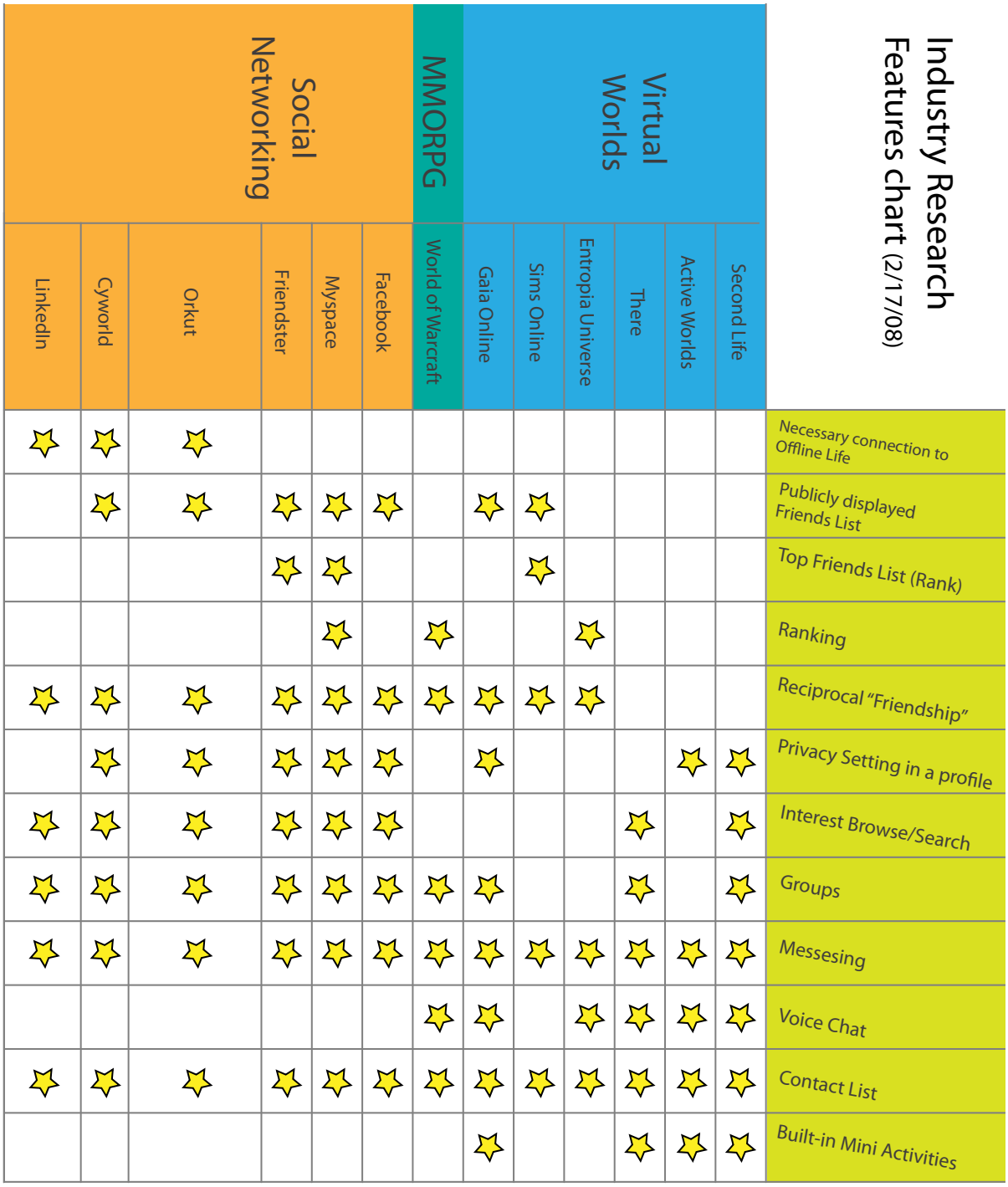
Appendix A — Industry Matrix



* Unless noted, features provided by Third-party applications were excluded.

Industry Research Features chart (2/17/08)

	Virtual Worlds					MMORPG	Social Networking				
	Second Life	Active Worlds	There	Entropia Universe	Sims Online	Gaia Online	World of Warcraft	Facebook	Myspace	Friendster	Orkut	Cyworld	LinkedIn
Customizabe Avatar	★	★	★	★	★	★	★					★	
Purchaseable Items	★	★	★		★	★	★	★				★	
Currency (e.g., Linden $)	★	★	★	★	★	★	★					★	
Clear Goal(s) (over the entire experience)					★		★						★
Missions (e.g. Quests in W.o.W.)				★	★		★						
Add-on platform							★	★	★	★	★		
Integration into other services (e.g., Facebook App); 3rd party apps can count here	★					★	★						
Additional Notes										You can add "I'm a Fan of..." for favorite Friendster sites	When you "Friend" someone, you can also note to yourself how close you are with that person (haven't met, acquaintance, friend, good friend, best friend); note only visible to you.		There is no publicly visible friends list, but you can see how many connections another user has.

* Unless noted, fe

Appendix B — SWOT Analysis

Strengths, Weaknesses, Opportunities, and Threats Analysis

Strengths	Second Life	Gaia	World of Warcraft	Facebook	MySpace
What are your business advantages?	- Lots of public attention - Free membership option - User-owned property - Wide demographic acceptance	- Free to use - Experienced US economist hired to run virtual economy: http://www.news.com/Economist-explains-move-to-virtual-world/2008-1043-6208798.html	- Very diverse player demographics: http://askbobrankin.com/world_of_warcraft.html - Continues storyline of Warcraft series (Marcraft 1, 2 & 3), attracting long-term users: http://www.worldofwarcraft.com/info/story/index.html	- Lots of public attention: http://conversationstarter.hbsp.com/2007/11/the_business_value_of_social_n.html - Spread through word of mouth	- Huge user base; top networking site in the US (as of October 2007): http://bigtech.blogs.fortune.cnn.com/2007/11/15/nielsen-facebook-growth-outpaces-myspace/
What are your core competencies?	- Letting users create their world however they want -Allowing users to own what they create	- Main site targeting the youth community and teens - Many different things to do (watch shows, play games, talk to people, anime, role playing, customization)	- Users work towards accomplishing goals in team settings - Eases new users into the interaction possibilities step by step - Begins with fast achievement of small goals, then moves towards slower achievement of bigger goals - 3rd party addons: http://wowui.incgamers.com/	- Helps people and classmates keep in touch - Allows 3rd party apps: http://sify.com/finance/fullstory.php?id=14596698	- Flexibility in customizing user pages (less restrained than Facebook); freedom of expression: http://money.cnn.com/2007/09/18/technology/myspace_strikes.fortune/index.htm - Showcases new groups (musicians, artists, businesses, politicians, etc)
Where are you making the most money?	- Organizations will pay lots to get help - Land sales	- Rare items, 2 per month, for $2.50 each: http://gigagamez.com/2007/04/23/move-over-myspace-gaia-online-is-here/	- User monthly subscription	- Demographically targeted ads: http://www.marketingpilgrim.com/2007/08/facebook-really-does-make-money.html	Advertising: http://www.macworld.com/article/51004/2006/05/myspace.html http://www.comscore.com/mt/mt-search.cgi?tag=Social%20Networking&blog_id=2
What are you doing well?	- Flashy graphics - Voice chat realism - Fostering resident creativity	- Collaborating with advertisers such as New Line Cinemas to successfully promote movies: http://www.marketingvox.com/archives/2007/04/24/new-virtual-world-attracts-2mm-uniques/ - Integration with facebook: http://www.pr-usa.net/index.php?option=com_content&task=view&id=62092&Itemid=9 - Users earn Gaia money for doing pretty much anything http://www.benchmark.com/news/sv/2007/04_22_2007.php	- Getting users addicted to playing the game due to advancement and social pressures: http://www.tomsgames.com/us/2006/08/08/world_of_warcraft_players_addicted/ - Constant updates according to user feedback - Easter eggs: http://pc.ign.com/articles/686/686256p1.html	- Viral effect: http://seattlepi.nwsource.com/lifestyle/274_facebook.html	- Allowing users freedom of expression in customizing their profiles - Publicizing people, events, and groups to a large user base - Catering to specific niches (music, political groups, fashion)

Weaknesses	Second Life	Gaia	World of Warcraft	Facebook	MySpace
What areas are you avoiding?	- Tangible (game) goals - NPCs (Non Player Characters) with useful purposes (e.g. guide, police)	- True 3-dimensionality (not just isometric) - Appealing to an adult audience	- Social networking	- Fully protecting user privacy; many privacy options must be manually set by users in their profiles: http://www.newsfactor.com/news/Facebook-Draws-Fire-for-Info-Feeds/story.xhtml?story_id=01300170BUI0	- Fully addressing security issue and illegal activities - More directed browsing (i.e. most popular)
Where do you lack resources?	- Creating more in-house content - Regulating in-world land issues	- Better methods of payments for users under 18	- Servers are strained: http://news.bbc.co.uk/1/hi/technology/4974456.stm	- UI decisions not based on any user tests	- Monitoring sexual predators: http://www.cbsnews.com/stories/2006/02/06/eveningnews/main1286130.shtml
What needs improvement?	- UI confusing for new users - Lack of direction for new users - Communication capabilities - Consistency of system performance - Reducing lag in the system	- Parental control: http://www.gaiaonlinesucks.com/ask.html - Harsh bans, but no other actions to prevent pedophiles: http://www.gaiaonlinesucks.com/ask.html - More engaging games	- Supporting casual gamers: http://www.gamernode.com/features/3655-world-of-warcraft-for-casual-gamers/index.html - Users cannot do much without joining a guild: http://www.gamasutra.com/features/20060222/sirlin_01.shtml	- Privacy, users' information is generally not well-protected: http://www-swiss.ai.mit.edu/6805/student-papers/fall05-papers/facebook.pdf - Security, no monitoring controls in place: http://www.businessweek.com/technology/content/oct2007/tc2007104_796128.htm?chan=search - Facebook apps have gone from cool to annoying: http://cmu.facebook.com/group.php?gid=7435662391 - Custom apps made by users clutter pages - Adding robust search capabilities: http://www.news.com/8301-10784_3-9771315-7.html	- Needs more security: http://www.businessweek.com/technology/content/oct2007/tc2007104_796128.htm?chan=search - Cleaner user interface and navigation: http://www.businessweek.com/innovate/content/aug2007/id20070827_614871.htm
Where are you losing money?	- Lots of new users leave	- Does not appeal to users outside of the targeted age range	- Collaborating with businesses	- Advertising, MySpace is much more developed as an advertising platform than Facebook: http://www.comscore.com/mt/mt-search.cgi?tag=Social%20Networking&blo	- Losing teen visitors to rival Facebook: http://www.usatoday.com/tech/news/2007-07-12-myspace-loses-teens_N.htm

Opportunities	Second Life	Gaia	World of Warcraft	Facebook	MySpace
Any beneficial trends?	- Really dedicated content creators - We're more successful than our direct competitors	- Daily traffic trends are increasing: http://www.thealarmclock.com/mt/archives/2007/03/12m_invested_in.html - TimeWarner has invested a large amount in January 2008: http://www.dmwmedia.com/news/2008/01/09/time-warner-invests-gaia-online-virtual-world-teens	- Still increasing in subscribers: http://news.digitaltrends.com/news/story/15508/world_of_warcraft_hits_10_mln_subscribers	- Expansive growth in the last several years, poised to surpass MySpace as most widely used social networking site: http://www.alleyinsider.com/2008/01/the-real-story-facebook-about-to-pass-myspace-in-traffic.html	- Continued growth internationally: http://www.businessweek.com/globalbiz/content/jul2007/gb20070710_870793.htm?chan=search
Niches that competitors are missing?	- Flying avatars - Organizational uses - Runs on mobile devices: http://techdigest.tv/2008/02/mwc_2008_second.html	- Users can bring their online videos into the world to create their own channels of streaming content: http://mashable.com/2007/11/01/gaia-vj/	- eSports: http://www.gamesindustry.biz/content_page.php?aid=33172	- Users enjoy creating their own games and 3rd party apps: http://www.slate.com/id/2182149/ - Semi-private networks & different levels of friends (limited profiles)	- Integration with Mobile Devices (e.g. Helio, Vodafone; http://live.marketclusters.com/cl2/view/2007/02/07/myspace_partners_with_vodafone/) - Video Hosting - MySpace Fashion: http://www.businessweek.com/innovate/content/aug2007/id20070827_614871.htm - Giving political parties/candidates a forum: http://www.businessweek.com/technology/content/dec2007/tc20071213_093878.htm?chan=search
New technologies?	- Distance-proximity voice chat - Light-weight 3D	- Direct connection to Facebook through app as of January 2008: http://www.virtualworldsnews.com/2008/01/interview-gaia.html	- Possibility of mobile support: http://multiplayerblog.mtv.com/2008/02/13/blizzard-considering-world-of-warcraft-mobile-sort-of-and-other-developments/	- Makes it easy for users to develop 3rd party apps	- MySpace on mobile phones: http://money.cnn.com/2007/09/18/technology/myspace_strikes.fortune/index.htm - 3rd party app platform http://www.techcrunch.com/2008/01/29/myspace-platform-goes-live-february-5-accepting-developer-signups-now/

Threats	Second Life	Gaia	World of Warcraft	Facebook	MySpace
Obstacles to overcome?	- Less overwhelming to new users - Retaining users - New customers are more consumers than producers, need guidance acclimating to the environment	- Random glitches in software: http://gaia.wikia.com/wiki/Gaiapedia	- Helping gamers develop healthy gaming habits: http://www.tomsgames.com/us/2006/08/08/world_of_warcraft_players_addicted/ - Players are farming (doing nothing but collecting resources for sale to earn money): http://www.news.com/Real-money-in-a-virtual-world/2030-1069_3-5905390.html	- Needs to be able to support rapidly growing user base & demographic expansion	- Providing more security for teens and younger users: http://www.businessweek.com/technology/content/oct2007/tc2007104_796128.htm?chan=search
Competitors?	- Kaneva - Gaia Online	- GirlSense	- Runescape: http://www.gamesetwatch.com/2007/12/opinion_2007s_top_5_mmo_trends.php - Maplestory: http://www.gamesetwatch.com/2007/12/opinion_2007s_top_5_mmo_trends.php - Everquest - Lineage	- Orkut - MySpace	- Facebook
Vulnerabilities?	- In-world stalkers - Piracy of scripts	- Worm attack (XSS vulnerability)	- Servers are strained: http://news.bbc.co.uk/1/hi/technology/4974456.stm	- Users will expect more from social networking, such as catering to specific niches and interests: http://www.nytimes.com/2007/03/03/technology/03social.html?ex=1330578000&en=f718f182170673a4&ei=5088 - Your life is an open book online; user information is exposed; privacy concerns such as news feeds fiasco in 2006, see: http://www.danah.org/papers/FacebookAndPrivacy.html	- People are getting annoyed with ads and moving on to other mediums (February 2008): http://www.businessweek.com/innovate/content/aug2007/id20070827_614871.htm - Hackers (Security issues)

Appendix C — Survey
C.1 Survey Questions

1. Welcome

Thank you for helping us improve Second Life! Our team of masters students in Human Computer Interaction at Carnegie Mellon University is working with Linden Lab to improver the user experience. If you have any questions or concerns, you may contact us at cmuhcilinden@gmail.com or you may contact Jaime Chen of Linden Lab at jchen@lindenlab.com. All data will be kept confidential.

1. You must be 18 or older to participate in this survey.

◯ I am over 18 goes to section 3

◯ I am under 18 goes to section 2

2. Must be 18

I'm sorry, but you must be 18 or older to participate. Thank you for your interest!

3. Raffle

1. We are giving away prizes to nine lucky participants:

One $50 iTunes gift card
One $25 Amazon gift card
One $25 Target gift card
Two $10 iTunes gift cards
Two $10 Amazon gift cards
Two $10 Target gift cards

If you are interested, you must complete the survey in its entirety and provide us with a valid email address. The address will not be shared with anyone, period.

If you do not wish to be entered in the raffle, you do not need to provide an email address.

4. Second Life Usage

1. Have you ever used Second Life?

◯ Yes goes to section 7

◯ No goes to section 5

5. Virtual World Usage

1. Have you used a virtual world other than Second Life (for example: Sims Online or World of Warcraft)?

◯ Yes goes to section 8

◯ No goes to section 10

6. Virtual World Usage

1. Have you used a virtual world other than Second Life (for example: Sims Online or World of Warcraft)?

◯ Yes goes to section 9
◯ No goes to section 11

7. Second Life

1. Why did you join Second life in the first place? (please check all that apply)

☐ A friend was on Second life
☐ Heard about it from the media (articles & ads) and wanted to see what it is
☐ My company/organization asked me to use it
☐ I wanted to use it for my company/organization
☐ I was looking for a creative outlet
☐ Other (please specify)

2. How long have you been on this Second Life?

◯ I'm brand new
◯ 1-3 months
◯ 3-6 months
◯ 6 months to a year
◯ 1-3 years
◯ More than 3 years

3. How many times in the past week have you logged-on to Second life?

◯ Multiple times a day
◯ Daily
◯ 4-6
◯ 2-3
◯ Once
◯ I log on less than weekly
◯ I no longer use Second Life

4. What was the reason you last logged into Second Life? (please check all that apply)

- [ ] To manage my business
- [ ] To attend an event
- [ ] To go to a business meeting
- [ ] To attend class
- [ ] To go shopping
- [ ] To hang out with friends
- [ ] To meet new friends
- [ ] To work
- [ ] Other (please specify)

5. The last time you started a conversation with a stranger in Second Life, how did it start? (check all that apply)

- ◯ I do not start conversations with strangers
- ◯ The stranger was near me
- ◯ I initiated a conversation with them because of their profile
- ◯ We were part of the same interest group
- ◯ We were introduced to each other by another resident
- ◯ We collaborated on creating something for Second Life
- ◯ Other (please specify)

6. How comfortable were you talking to this stranger?

- ◯ Very comfortable
- ◯ Comfortable
- ◯ Neutral
- ◯ Uncomfortable
- ◯ Very uncomfortable
- ◯ I do not start conversations with strangers

7. The last time a stranger started a conversation with you, why did the conversation start? (check all that apply)

- ☐ The stranger was near me
- ☐ They were interested in my profile
- ☐ We were part of the same interest group
- ☐ We were introduced to each other by another resident
- ☐ We collaborated on creating something for the Second Life
- ☐ I do not let strangers talk to me
- ☐ Other (please specify)

8. How comfortable were you starting the conversation with a stranger?

- ○ Very comfortable
- ○ Comfortable
- ○ Neutral
- ○ Uncomfortable
- ○ Very uncomfortable
- ○ I do not let strangers talk to me

9. How do you keep in touch with people you've met in Second Life? (please check all that apply)

- ☐ I don't keep in touch
- ☐ In-world chat in Second Life
- ☐ Group Chat in Second Life
- ☐ Instant Messaging in Second Life
- ☐ In a Social Network
- ☐ IM outside of Second Life
- ☐ Email
- ☐ In person
- ☐ Telephone
- ☐ Other (please specify)

10. How do you arrange a meeting in Second Life with friends? (please check all that apply)

- [ ] We discuss the details outside of Second Life
- [ ] We send each other messages when we are logged-on to Second Life
- [ ] We leave messages in Second Life for each other when someone is offline
- [ ] We've formed a group in Second Life to stay in touch
- [ ] We meet casually by going to the same places in Second Life
- [ ] Other (please specify)

11. In Second life what kind of activities do you do most often? (check all that apply)

- [ ] 1 on 1 Chatting
- [ ] Multi-party Chatting
- [ ] Messaging
- [ ] Participate in groups
- [ ] Attend in-world events
- [ ] Earning money, Selling items
- [ ] Buying things
- [ ] Building
- [ ] Clothing creation
- [ ] Art creation
- [ ] Creating other objects
- [ ] Avatar personalization
- [ ] Personalizing the world around you
- [ ] Mini games
- [ ] Political activity
- [ ] Finding friends
- [ ] Programming/ Scripting
- [ ] Other (please list)

12. Is there anything you can't do in Second Life that you'd like to do? (please specify)

13. How did you hear about the groups you've joined in Second Life? (please check all that apply)

- [ ] Word of mouth
- [ ] Search
- [ ] Classifieds
- [ ] Website
- [ ] I haven't joined any groups in Second Life
- [ ] Other (please specify)

14. Did you feel that any of your group memberships are beneficial to you?

- ◯ Yes
- ◯ No (please explain)

15. How easy or difficult is it to find groups you are interested in joining in Second Life?

- ◯ Very difficult
- ◯ Difficult
- ◯ Moderate
- ◯ Easy
- ◯ Very Easy

16. Do you wish there were more groups you could join in Second Life?

- ◯ No
- ◯ Yes (please describe)

17. What type of events do you attend in Second life (please check all that apply)

- [ ] I have never attended an event
- [ ] Public speakers
- [ ] Business meetings
- [ ] Classes/lectures
- [ ] Competitions
- [ ] Group related
- [ ] Live music/dancing
- [ ] Games/entertainment
- [ ] Other (please specify)

18. How did you hear about these events (please check all that apply)

- [ ] I have never attended an event
- [ ] Through group membership in Second Life
- [ ] Word of mouth in Second Life
- [ ] Word of mouth outside of Second Life
- [ ] Search
- [ ] Classifieds
- [ ] Online (websites)
- [ ] Other (please specify)

19. With whom do you use voice chat in Second Life? (check all that apply)

- [ ] I do not use voice chat
- [ ] People you know in Second Life
- [ ] People you know in real life
- [ ] Group members
- [ ] Anyone who talks to me
- [ ] Only people I speak to first
- [ ] Other (please specify)

20. If you do not use voice chat, why not? (please check all that apply)

- [ ] I use voice chat
- [ ] Do not have the equipment
- [ ] Did not know it was available
- [ ] Do not feel comfortable using voice chat with people I don't know
- [ ] Do not like voice chat in general
- [ ] Other (please specify)

21. Is your profile searchable?

- [ ] It is searchable within Second Life
- [ ] It is searchable on the World Wide Web
- [ ] It is not searchable
- [ ] I don't know

22. What type of information do you put in your profile? (please check all that apply)

- [ ] Your picture
- [ ] Real life first name
- [ ] Real life last name
- [ ] Email address
- [ ] Telephone number
- [ ] Hobbies/interests
- [ ] Nationality
- [ ] Birthday
- [ ] List of favorite locations
- [ ] List of groups
- [ ] List of friends
- [ ] Personal Website
- [ ] Relationship status
- [ ] Information about your significant other
- [ ] Information about your family
- [ ] Other personal information
- [ ] Other (please specify)

23. Is there anything you would like to be able to add to your profile that's not currently available? (please specify)

goes to section 6

8. Virtual Worlds

1. Which virtual world do you use most often?

- ◯ Gaia Online
- ◯ Sims Online
- ◯ Lineage
- ◯ Everquest
- ◯ World of Warcraft
- ◯ Kaneva
- ◯ There
- ◯ ActiveWorlds
- ◯ Moove
- ◯ Other (please specify)

2. How long have you been on this virtual world?

- ◯ I'm brand new
- ◯ 1-3 months
- ◯ 3-6 months
- ◯ 6 months to a year
- ◯ 1-3 years
- ◯ More than 3 years

3. How many times in the past week have you logged-on to this virtual world?

- ◯ Multiple times a day
- ◯ Daily
- ◯ 4-6
- ◯ 2-3
- ◯ Once
- ◯ I log on less than weekly
- ◯ I no longer use this virtual world

4. Why did you join this virtual world in the first place? (please check all that apply)

- ☐ A friend was on this virtual world
- ☐ Heard about it from the media (articles & ads) and wanted to To see what it is
- ☐ My company/organization asked me to use it
- ☐ I wanted to use it for my company/organization
- ☐ I was looking for a creative outlet
- ☐ I tried one virtual world, but wanted to find one I liked better
- ☐ Other (please specify)

5. If you no longer use this world, why did you leave? (please check all that apply)

- ☐ There wasn't enough to do
- ☐ I didn't have time
- ☐ I couldn't find anyone to hang out with
- ☐ It was too involved
- ☐ I was not what I expected
- ☐ I'm still active
- ☐ Other (please specify)

6. The last time you started a conversation with a stranger in this virtual world, how did the conversation start? (check all that apply)

- ☐ I do not start conversations with strangers
- ☐ I initiated a conversation with them because of their profile
- ☐ We were part of the same interest group
- ☐ We were introduced to each other by another resident
- ☐ We collaborated on creating something for the virtual world
- ☐ Other (please specify)

7. How comfortable were you speaking to this stranger?

- ◯ Very comfortable
- ◯ Comfortable
- ◯ Neutral
- ◯ Uncomfortable
- ◯ Very uncomfortable
- ◯ I do not start conversations with strangers

8. The last time a stranger spoke to you, why did the conversation start? (please check all that apply)

- ☐ I do not let strangers talk to me
- ☐ They were interested in my profile
- ☐ We were part of the same interest group
- ☐ We were introduced to each other by another resident
- ☐ We collaborated on creating something for the virtual world
- ☐ Other (please specify)

9. How comfortable were you?

- ◯ Very comfortable
- ◯ Comfortable
- ◯ Neutral
- ◯ Uncomfortable
- ◯ Very uncomfortable
- ◯ I do not let strangers talk to me

10. How do you keep in touch with people you've met in this virtual world? (please check all that apply)

- [ ] I don't keep in touch
- [ ] In-world chat
- [ ] Group chat in the virtual world
- [ ] Instant messaging in the virtual world
- [ ] In a Social Network
- [ ] IM
- [ ] Email
- [ ] In person
- [ ] Telephone
- [ ] Other (please specify)

11. With whom do you use voice chat in this virtual world? (check all that apply)

- [ ] People you know in Second life
- [ ] People you know in RL
- [ ] Group members
- [ ] Anyone who talks to me
- [ ] Only people I speak to first
- [ ] Other (please specify)

12. If you do not use voice chat, why not? (please check all that apply)

- [ ] I use voice chat
- [ ] Do not have the equipment
- [ ] Did not know it was available
- [ ] Do not feel comfortable using voice chat with people I don't know
- [ ] Do not like voice chat in general
- [ ] Other (please specify)

13. In this virtual world what kind of activities do you do most often? (check all that apply)

- [ ] 1 on 1 Chatting
- [ ] Multi-party Chatting
- [ ] Messaging
- [ ] Participate in groups
- [ ] Attend in-world events
- [ ] Earning money, Selling items
- [ ] Buying things
- [ ] Building
- [ ] Clothing creation
- [ ] Art creation
- [ ] Creating other objects
- [ ] Avatar personalization
- [ ] Personalizing the world around you
- [ ] Mini games
- [ ] Political activity
- [ ] Finding friends
- [ ] Programming/ Scripting
- [ ] Live music/dancing
- [ ] Other (please list)

14. Is there anything you can't do that you'd like to be able to do? (please specify)

goes to section 10

9. Virtual Worlds that are not Second Life

1. Is Second Life the virtual world you use most often?

- ◯ Yes
- ◯ No

2. Other than Second Life, which virtual world do you use most often?

- ◯ Gaia Online
- ◯ Sims Online
- ◯ Lineage
- ◯ Everquest
- ◯ World of Warcraft
- ◯ Kaneva
- ◯ There
- ◯ ActiveWorlds
- ◯ Moove
- ◯ Other (please specify)

For all following questions, please refer to your answer for question 2.

3. How long have you been on this virtual world?

- ◯ I'm brand new
- ◯ 1-3 months
- ◯ 3-6 months
- ◯ 6 months to a year
- ◯ 1-3 years
- ◯ More than 3 years

4. How many times in the past week have you logged-on to this virtual world?

- ◯ Multiple times a day
- ◯ Daily
- ◯ 4-6
- ◯ 2-3
- ◯ Once
- ◯ I log on less than weekly
- ◯ I no longer use this virtual world

5. Why did you join this virtual world in the first place? (please check all that apply)

- [ ] A friend was on this virtual world
- [ ] I heard about it from the media (articles & ads) and wanted To see what it is
- [ ] My company/organization asked me to use it
- [ ] I wanted to use it for my company/organization
- [ ] I was looking for a creative outlet
- [ ] I tried one virtual world, but wanted to find one I liked better
- [ ] Other (please specify)

6. If you no longer use this world, why did you leave? (please check all that apply)

- [ ] There wasn't enough to do
- [ ] I didn't have time
- [ ] I couldn't find anyone to hang out with
- [ ] It was too involved
- [ ] It was not what I expected
- [ ] I'm still active
- [ ] Other (please specify)

7. How do you keep in touch with people you've met in this virtual world? (please check all that apply)

- [ ] I don't keep in touch
- [ ] Instant Messaging within the virtual world
- [ ] Group chat in the virtual world
- [ ] In-world chat
- [ ] In a Social Network
- [ ] IM outside of the virtual world
- [ ] Email
- [ ] In person
- [ ] Telephone
- [ ] Other (please specify)

8. In this virtual world what kind of activities do you do most often? (check all that apply)

- [ ] 1 on 1 Chatting
- [ ] Multi-party Chatting
- [ ] Messaging
- [ ] Participate in groups
- [ ] Attend in-world events
- [ ] Earning money, Selling items
- [ ] Buying things
- [ ] Building
- [ ] Clothing creation
- [ ] Art creation
- [ ] Creating other objects
- [ ] Avatar personalization
- [ ] Personalizing the world around you
- [ ] Mini games
- [ ] Political activity
- [ ] Finding friends
- [ ] Programming/ Scripting
- [ ] Live music/dancing
- [ ] Other (please list)

9. Is there anything you can't do in this virtual world that you'd like to do? (please specify)

goes to section 10

10. Social Networks?

1. Do you use any of the following social networking services? (check all that apply)

- ☐ MySpace
- ☐ Facebook
- ☐ Friendster
- ☐ Bebo
- ☐ Orkut
- ☐ LinkedIn
- ☐ Flickr
- ☐ YouTube
- ☐ No, I don't use social networking services
- ☐ Other (please specify)

'no' goes to section 12
all others go to section 11

11. Social Networks

1. How many of these social networks have you logged into in the last month?

- ◯ 0
- ◯ 1-2
- ◯ 3-4
- ◯ 5-6
- ◯ 7 or more

2. Do you have multiple accounts on the same network?

- ◯ No
- ◯ Yes (please explain why)

3. Which one of these Social Networks do you use MOST often (if you more than 1 equally, please pick one)?

- ◯ I don't use social networking services
- ◯ MySpace
- ◯ Facebook
- ◯ Friendster
- ◯ Bebo
- ◯ Orkut
- ◯ LinkedIn
- ◯ Flickr
- ◯ YouTube
- ◯ Other (please specify)

For the following questions, please answer according to your answer to question number 4.

4. How long have you had an account in this social network?

- ◯ I don't use social networking services
- ◯ I'm brand new
- ◯ 1-3 months
- ◯ 3-6 months
- ◯ 6 months to a year
- ◯ 1-3 years
- ◯ More than 3 years

5. Why did you join this Social Network? (please check all that apply)

- ☐ I don't use social networking services
- ☐ To find new friends
- ☐ To find old friends
- ☐ Keep contact with current friends
- ☐ Dating
- ☐ Everyone else has one
- ☐ Needed account for work/school
- ☐ Other (please specify)

6. Do you use privacy settings on you profile?

- ◯ Yes
- ◯ No
- ◯ I don't know
- ◯ Does not apply

7. Why do you usually add someone to your friend list? (please check all that apply)

- ☐ I don't use social networking services
- ☐ We were already friends
- ☐ They are family members
- ☐ We are colleagues
- ☐ It would be socially inappropriate to say no because you know them
- ☐ Having lot of Friends makes you look popular
- ☐ It's a way for indicating that you are a fan (of that person, band, product, etc.)
- ☐ Your list of Friends reveals who you are
- ☐ Their Profile is cool so being Friends makes you look cool
- ☐ Being Friends lets you share bulletins and Friends-only options
- ☐ You can use your Friends list to find someone later
- ☐ Other (please specify)

8. What kind of things do you look at before you accept a person as a friend in a social network? (please check all that apply)

- ☐ I don't use social networking services
- ☐ Number of friends
- ☐ Mutual friends
- ☐ Groups
- ☐ Comments from other users
- ☐ His/her photos
- ☐ How the person contacted you
- ☐ Other (please specify)

9. Why do you use your social network? (please check all that apply)

- [ ] I don't use social networking services
- [ ] It's part of my routine
- [ ] Emailed update notices
- [ ] To find someone new
- [ ] Checking out a new Friend
- [ ] To communicate with friends
- [ ] For something to do in my spare time
- [ ] To participate in a group related activities
- [ ] Other (please specify)

10. In what ways do you participate in your social network most often? (please check all that apply)

- [ ] I don't use social networking services
- [ ] 1 on 1 Chatting
- [ ] Multi-people Chatting
- [ ] Messaging
- [ ] Leaving Comments
- [ ] Groups
- [ ] Earning more money/ Buying things
- [ ] Profile personalization
- [ ] Games, quizzes or other entertainment
- [ ] Finding a new friend
- [ ] Other (please specify)

goes to section 12

12. Demographics

1. What is your age range?

- ◯ 18 to 24
- ◯ 25 to 34
- ◯ 35 to 44
- ◯ 45 to 54
- ◯ 55 and above

2. What is your gender?

- ◯ Male
- ◯ Female

3. What is your education level (check highest level achieved to date)

- ◯ Some school
- ◯ High school graduate
- ◯ Some college
- ◯ Associate's degree
- ◯ Bachelor's degree
- ◯ Master's degree
- ◯ PHD, MD, DMD, or other terminal degree

4. Please select the category that best describes your area of work.

- ◯ Arts, Design, Entertainment, Sports and Media
- ◯ Management, Business or Finance
- ◯ Sales
- ◯ Office and Administrative Support
- ◯ Computer Science, Math or Engineering
- ◯ Life, Physical and Social Sciences
- ◯ Community and Social Services
- ◯ Legal
- ◯ Education, Training and Library Science
- ◯ Healthcare
- ◯ Protective Services (e.g., firefighters, police)
- ◯ Food Preparation and Serving
- ◯ Building and Grounds Cleaning and Maintenance
- ◯ Personal Care and Service
- ◯ Farming, Fishing and Forestry
- ◯ Construction, Maintenance and Repair
- ◯ Production
- ◯ transportation and Material Moving
- ◯ Military
- ◯ Currently unemployed
- ◯ Other (please specify)

goes to section 13

13. Thank You!

Thank you for sharing your knowledge with us! You have directly contributed to improving Second Life. Again, all data will be kept confidential.

1. Would you be willing to participate in a follow-up interview?

◯ Yes goes to section 14

◯ No goes to section 15

14. Personal Information

Please provide your information below. All of your information shall remain confidential, not to be shared outside of our research group and will be destroyed upon the close of our research period.

1. What is your name?

2. What is your email address?

3. What is your phone number? (optional)

4. What is your preferred method of contact?

◯ Telephone

◯ Email

◯ Other

For Telephone & Other (please specify)

goes to section 15

Thank you for your continued participation! If we are interested in an interview, someone from our team will contact you soon!

15. End of Survey

This is the end of the survey. Please press "Done" to exit. Thank you!

Appendix C —
C.2 Raw Data Tables

Why did you join?	SL	VW
A friend was on it	32%	57%
Heard about it from the media (articles & ads) and wanted to see what it is	51%	27%
My company/organization asked me to use it	6%	5%
I wanted to use it for my company/organization	9%	2%
I was looking for a creative outlet	31%	10%

Figure 1. Why did you join?

	Brand New	1-3 months	1-3 years	More than 3 years
Multiple times a day	0%	0%	40%	50%
Daily	0%	25%	40%	20%
I log on less than weekly	25%	25%	2%	0%
I no longer use Second Life	63%	25%	2%	10%

Figure 2. How often do you log on to Second Life?

	Brand new	1-3 months	1-3 years	More than 3 years
Multiple times a day	0%	0%	15%	0%
Daily	0%	17%	15%	0%
I log on less than weekly	50%	17%	23%	0%
I no longer use this virtual world	33%	33%	46%	75%

Figure 3. How often do you log on to Virtual World (Non-SL users)

	Brand new	1-6 months	6 months to a year	1+ years
To hang out with friends/social reasons	0%	69%	58%	70%
To meet new friends	25%	38%	17%	20%
To manage my business	0%	23%	8%	47%
To attend an event	0%	23%	17%	32%
To go shopping	0%	31%	17%	25%
To work	25%	46%	8%	31%
To explore	38%	0%	25%	0%
To go to a business meeting	0%	0%	0%	16%

Figure 4. Why did you log on to Second Life the last time?

	SL users on other Virtual Worlds	Non SL users on other Virtual Worlds
There wasn't enough to do	43%	18%
I didn't have time	26%	61%
I couldn't find anyone to hang out with	19%	12%
It was not what I expected	29%	3%

Figure 5. Why did you leave Virtual World/Second Life?

	Being Approached by Strangers				Initiating conversation			
	Brand new	1~6 months	6 months to a year	1+ years	Brand new	1~6 months	6 months to a year	1+ years
The stranger was near me	80%	67%	67%	56%	33%	58%	83%	41%
Interested in Profile	0%	17%	17%	44%	0%	8%	17%	16%
We were part of the same interest group	0%	0%	8%	16%	0%	8%	0%	7%
We were introduced to each other by another resident	0%	8%	0%	11%	0%	8%	0%	13%

Figure 6. Why did you interact with this stranger?

		Brand new	1-6 months	6 months to a year	1+ years
SL	Initiating conversation	1.25	3.31	3.92	3.96
	Approached by stranger	1.50	3.31	4.33	4.09
VW	Initiating conversation	1.67	3.46	3.00	3.96
	Approached by stranger	1.67	3.31	3.80	3.77

Figure 7. How much are you comfortable with ...

	brand new	1-6 months	6 months to a year	1+ years
Personal website	13%	23%	33%	33%
Email	38%	0%	8%	6%
Telephone number	13%	0%	0%	0%
Your picture	13%	38%	67%	48%
Real life first name	25%	0%	17%	11%
Real life last name	13%	0%	8%	5%
Birthday	25%	8%	25%	6%
Nationality	38%	15%	25%	22%
Hobbies/interests	25%	38%	67%	50%
List of favorite locations	13%	38%	50%	56%
List of groups	25%	77%	50%	80%
List of friends	13%	8%	42%	28%

Figure 8. What do you have in your profile?

	brand new	1-6 months	6 months to a year	1+ years
I don't Keep in touch with others	100%	15%	25%	6%
In World	0%	85%	75%	91%
Im/Email	0%	31%	33%	73%
Social Network	8%	0%	8%	19%
Telephone	0%	0%	25%	31%
In Person	8%	0%	17%	22%

Figure 9. How do you keep in touch with people you met in Second Life?

	Brand new	1-6 months	6 months to a year	1+ years
I have never attended an event	100%	46%	25%	6%
Public speakers	0%	31%	33%	33%
Business meetings	0%	8%	8%	42%
Classes/lectures	0%	38%	50%	47%
Competitions	0%	23%	33%	31%
Group related	0%	31%	25%	55%
Live music/dancing	0%	46%	67%	80%
Games/entertainment	0%	31%	33%	47%
Art/shows	0%	0%	8%	6%

Figure 10. What type of events do you attend?

	1-6 months	6 months to a year	1+ years
Through group membership in Second Life	71%	78%	87%
Word of mouth in Second Life	71%	44%	70%
Word of mouth outside of Second Life	14%	0%	21%
Search	100%	78%	52%
Classifieds	14%	22%	21%
Online (websites)	57%	22%	26%

Figure 11. How did you hear about these events?

	brand new	1-6 months	6 months to a year	1+ years
Ease of finding a group	3	3.35	3.92	3.59

Figure 12. How easy is it to find a group of your interest? (in 5 points Likert scale)

	brand new	1-6 months	6 months to a year	1+ years
Is Group Beneficial	25%	69%	58%	91%

Figure 13. How beneficial is a group? (in 5 points Likert scale)

	brand new	1-6 months	6 months to a year	1+ years
Business	0%	18%	10%	41%
Chat	14%	91%	80%	83%
Group/Event	14%	64%	40%	68%
Building	0%	64%	50%	76%
Buying things	0%	45%	60%	49%
Avatar personalization	14%	64%	30%	39%
Finding Friends	0%	36%	30%	29%

Figure 14. What are your main activities in Second Life?

	SL users	Others
Multiple Account	17%	6%

Figure 15. Do you have multiple account in Social Networks?

	1-6 months	6 months to a year	1-3 years	3+years
Number of friends	3%	6%	3%	7%
Mutual friends	33%	50%	66%	53%
Groups	33%	19%	13%	13%
Comments from other users	0%	9%	12%	15%
His/her photos	17%	28%	23%	32%
How the person contacted you	33%	59%	49%	40%

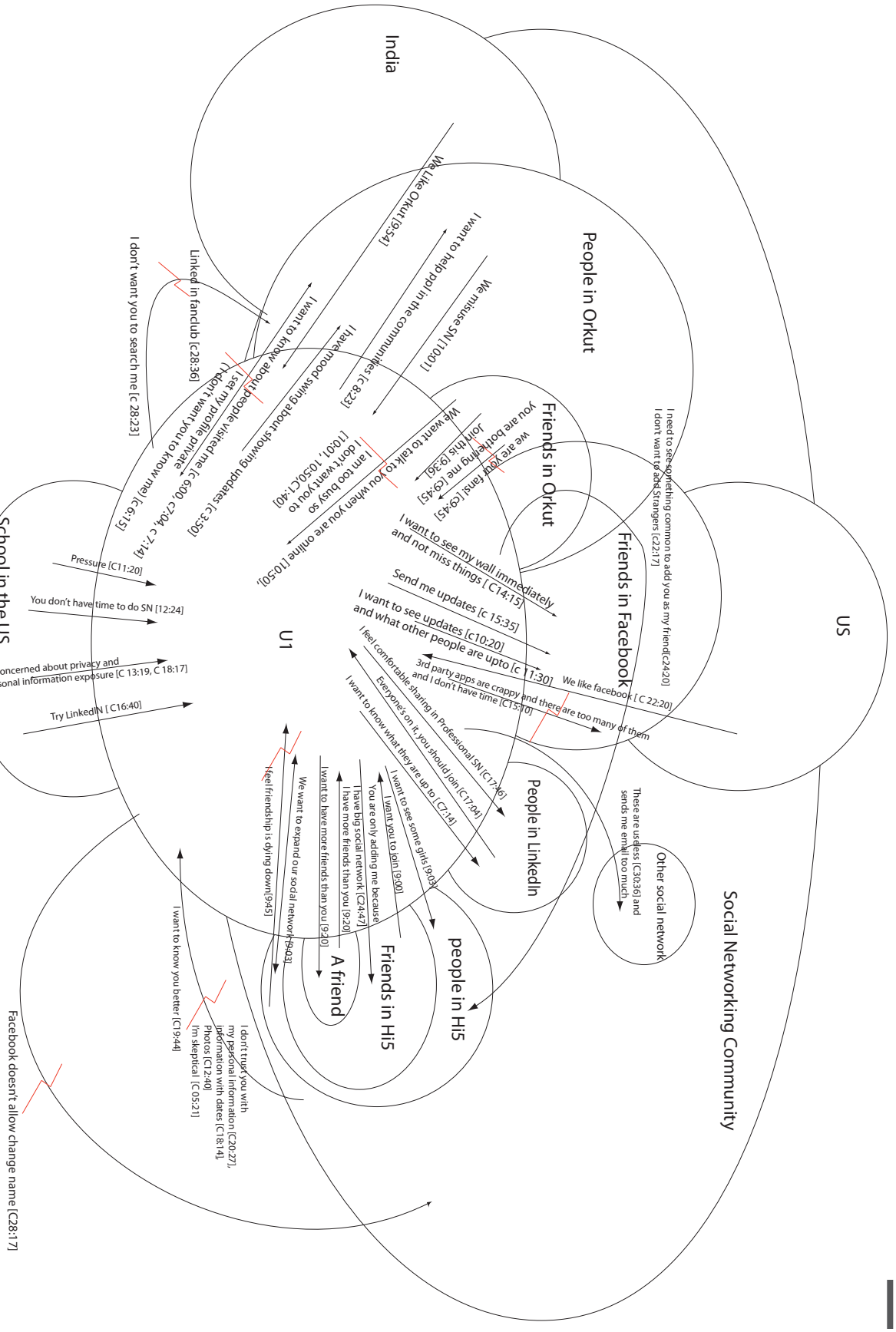
Figure 16. In Social Networks, what do you check before you add someone as a friend?

	1-6 months	6 months to a year	1-3 years	3+years
We were already friends	77%	84%	88%	90%
They are family members	30%	34%	50%	52%
We are colleagues	37%	44%	55%	70%
It would be socially inappropriate to say no because you know them	20%	31%	28%	42%
It's a way for indicating that you are a fan (of that person, band, product, etc.)	7%	9%	18%	13%
Being Friends lets you share bulletins and Friends-only options	17%	25%	15%	17%
You can use your Friends list to find someone later	37%	47%	30%	32%

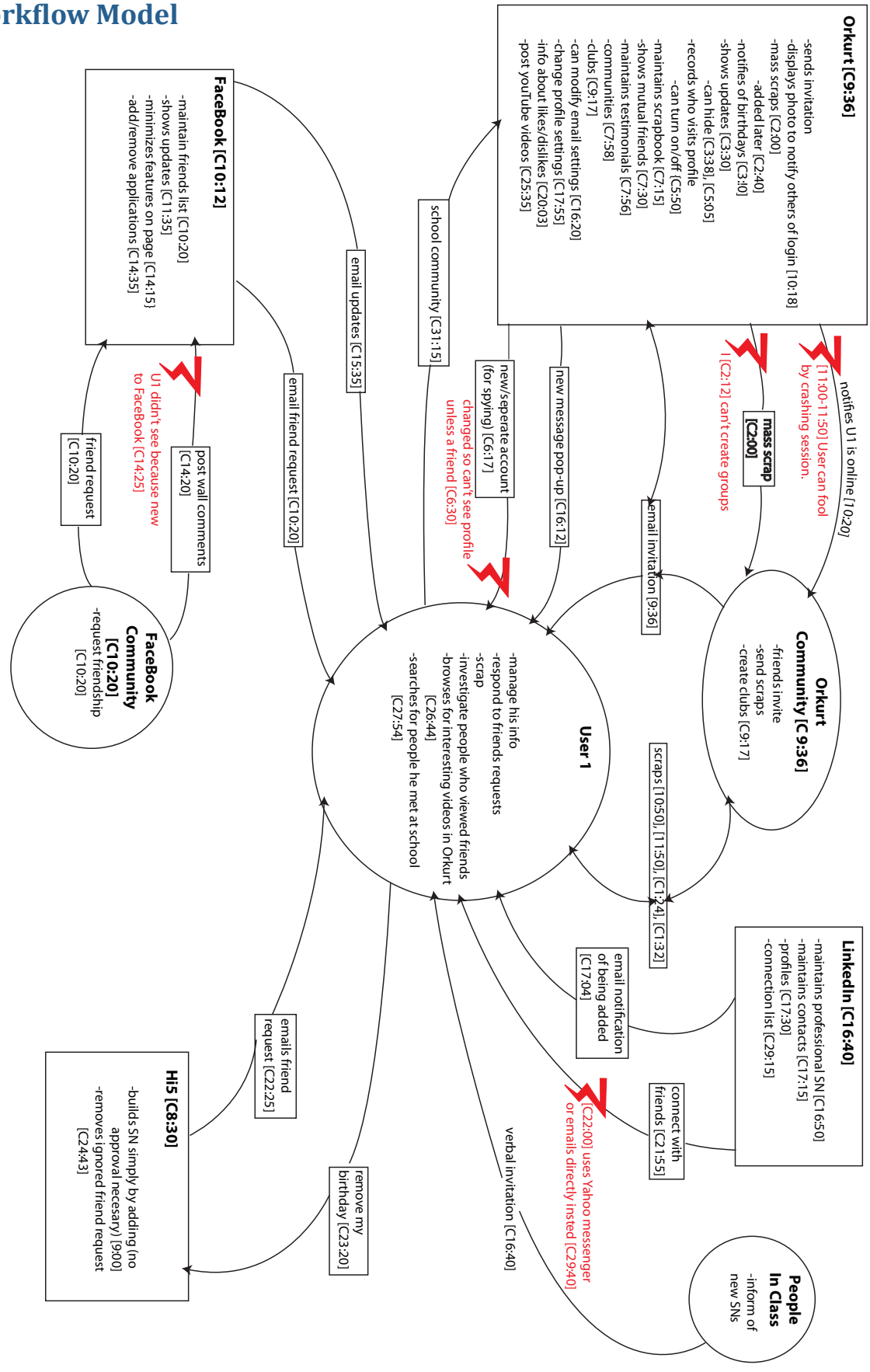
Figure 17. Why did you add someone as your friend in Social Network?

Appendix D — Social Network Expert #1 CI Models

D.1 Cultural Model

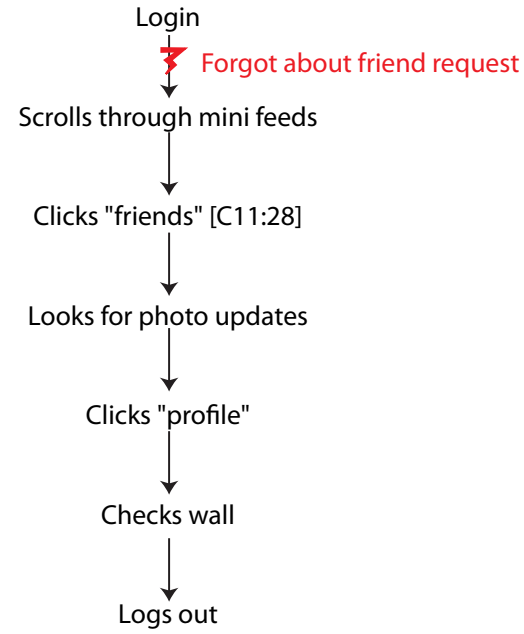


D.2 Workflow Model

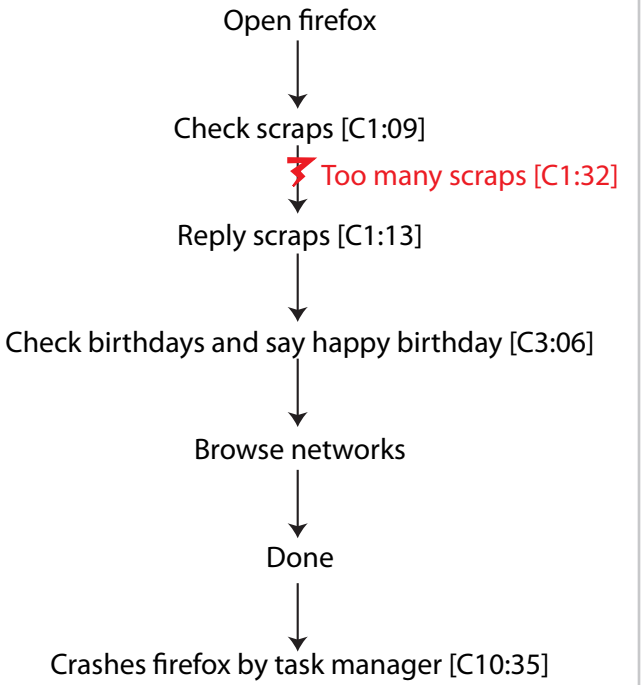


D.3 Sequence Models

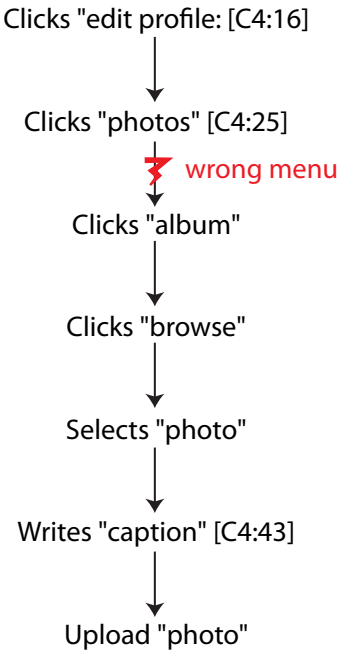
Trigger: Email notice: From FB [C10:25]
Task: Verify friend request



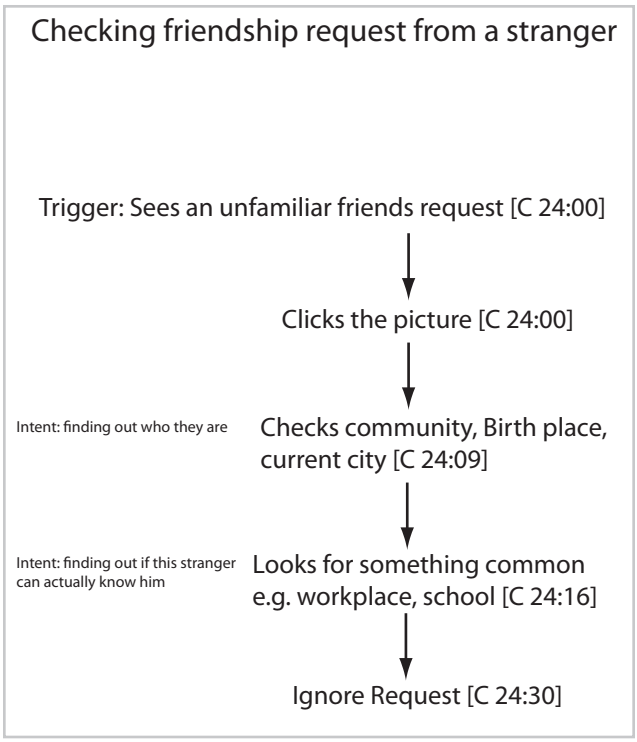
Trigger: Part of routine

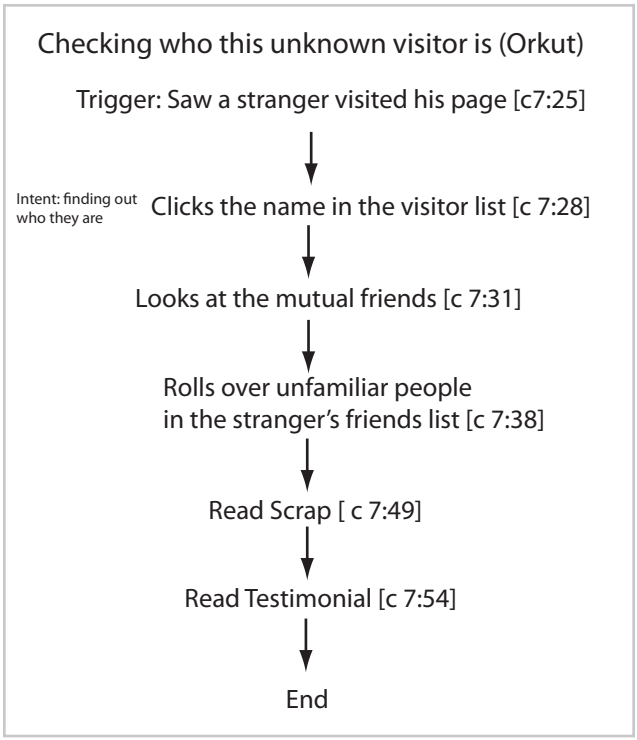


Trigger: Wants to add a photo [c4:14]
Task 1: Intent: Add photo

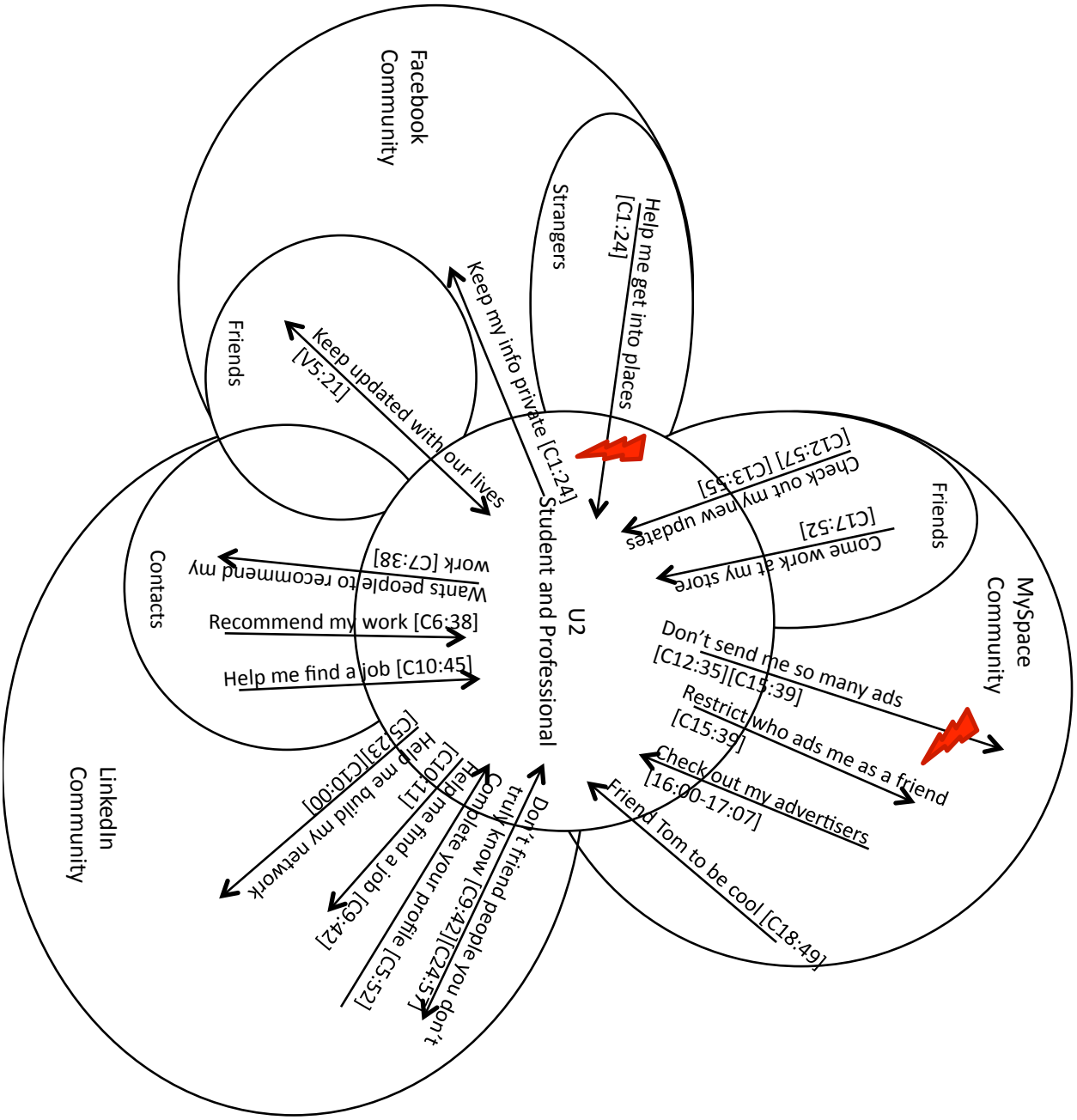


Task 2: Intent: Hide update

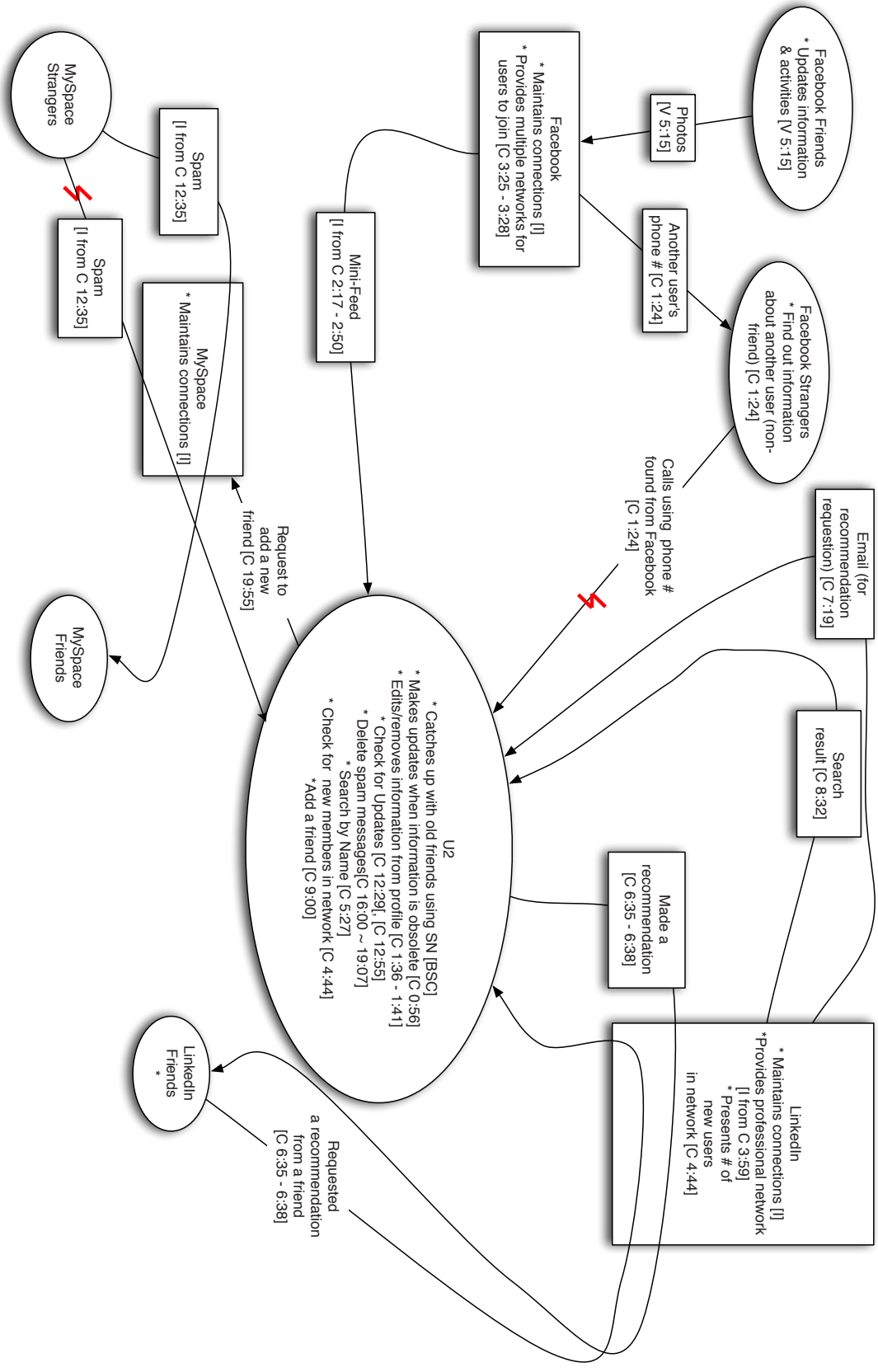

Checking friendship request from a stranger
Trigger: Sees an unfamiliar friends request [C 24:00]
Clicks the picture [C 24:00]
Intent: finding out who they are
Checks community, Birth place, current city [C 24:09]
Intent: finding out if this stranger can actually know him
Looks for something common e.g. workplace, school [C 24:16]
Ignore Request [C 24:30]


Checking who this unknown visitor is (Orkut)
Trigger: Saw a stranger visited his page [c7:25]
Intent: finding out who they are
Clicks the name in the visitor list [c 7:28]
Looks at the mutual friends [c 7:31]
Rolls over unfamiliar people in the stranger's friends list [c 7:38]
Read Scrap [c 7:49]
Read Testimonial [c 7:54]
End

Appendix E — Social Network Expert #2 CI Models
E.1 Cultural Model



E.2 Workflow Model



E.3 Sequence Models

Trigger: Part of Routine

Intent: Plug in

Log-in.

↓

Click on “Home”.

↓

Go down to “Top Friends”.

↓

Intent: Keep updated with friends

Click on people who updates regularly [C13:05].

↓

Browse a user’s page.

↓

Use browser back button to get out.

Trigger: Visual cue saying “New Comments” after logging in [C12:12]
Task: Check for new Comments

Intent: Check out updates

Click on “New Comments” [C12:22].

↓

Many spam ads as comments [C12:24]

Scroll up and down to see meaningful comments [C12:24].

↓

Click on “Home” [C12:40].

Trigger: Unsure whether information on current profile is correct [C14:50]
Task: Confirm whether displayed profile information is correct.

(From “Home” page)

↓

Click “Edit Profile” [C14:55]

↓

Intent: Look for relevant information

Scrolls up and down the edit page

↓

Confirms information [C15:05]

↓

Use browser back button to get out.

Trigger: I see spam comments on my wall [C17:00]
Task: Get rid of meaningless comments.

Intent: Manage personal page

(From "Home" page)
Click "View/Edit All" on Wall sections
↓
Checks all checkboxes of spam comments
↓
Click "Deleted Selected"
↓
Confirm deletion

Trigger: Part of Routine

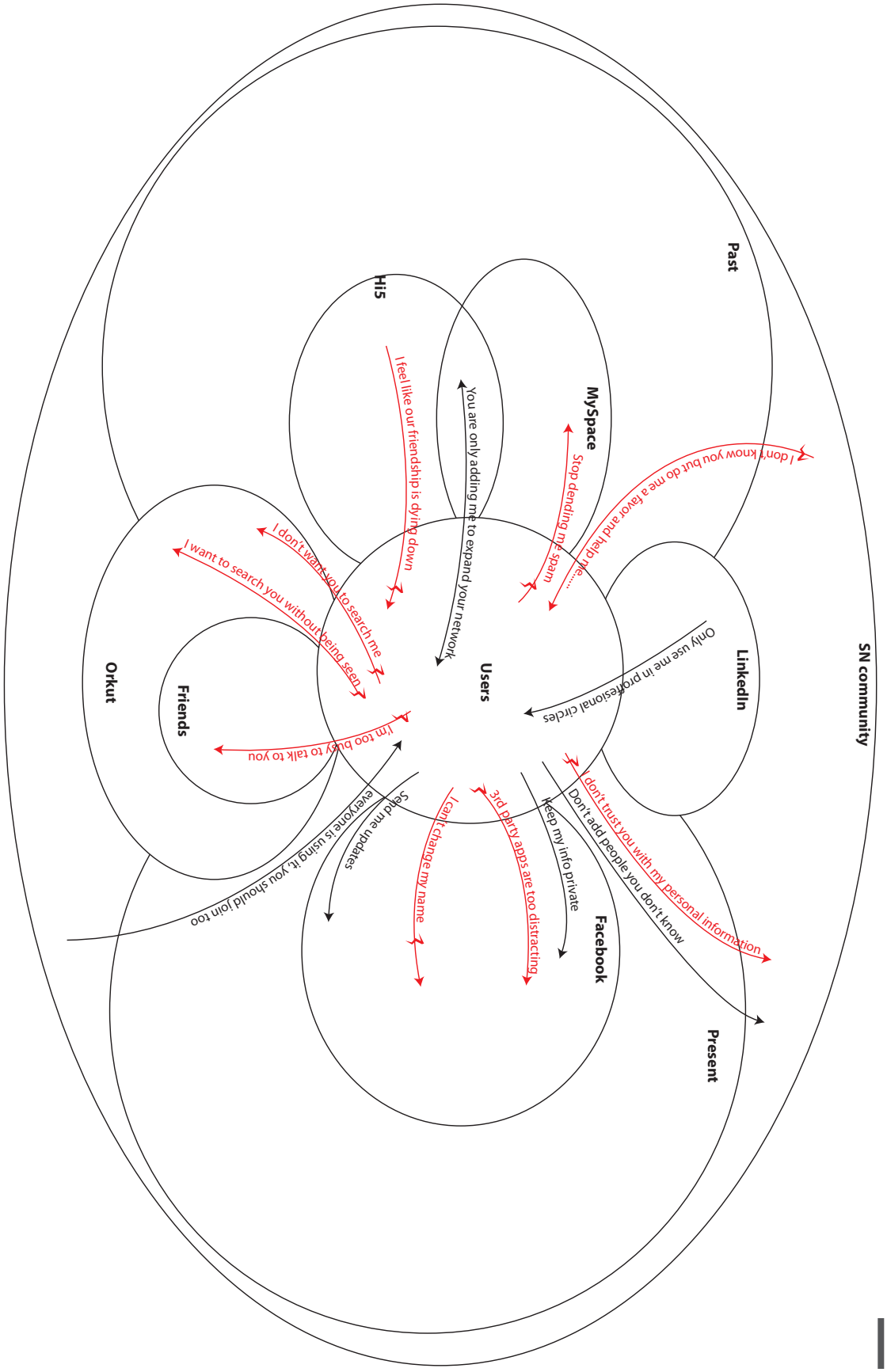
Task: Wants to check updates of friends

Intent: Check updates of friends

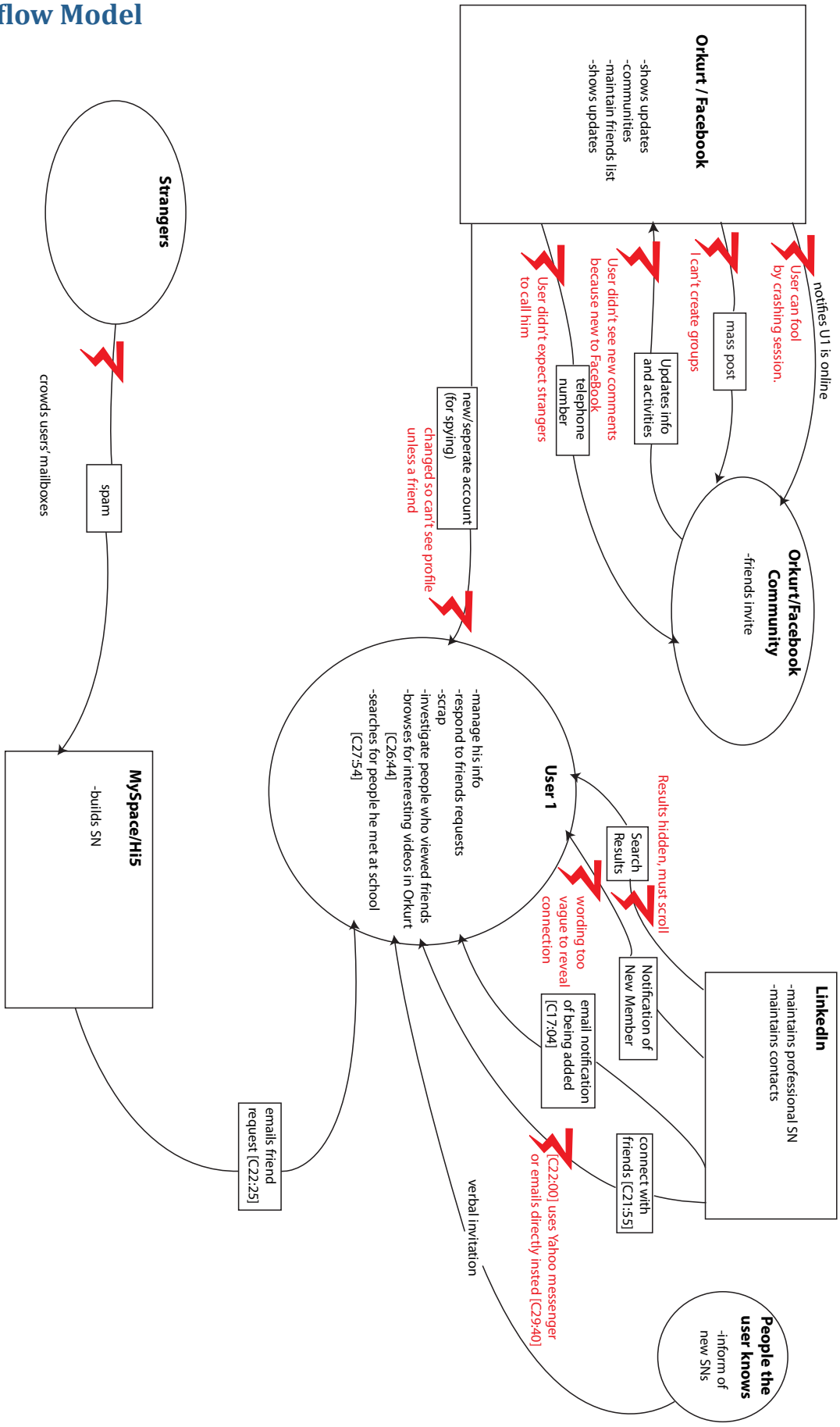
Logs in to Facebook [V 4:49]
↓
Checks newsfeeds [V 5:10]
↓
Checks updated profiles of friends [V 5:22]
↓
Browses through photos of friends [V 6:20] [V 10:01]
↓
Browses through photos of friend's friends [V 6:20]
↓
Clicks on Friends link [V 10:59]
↓
Browses profiles and updated photos [V 11:21]
↓
Clicks on updated photos [V 11:32]
↓
Looks at personal Profile [V 13:25]
↓
Updates profile [V 14:16]

Appendix F — Consolidated Social Network Expert CI Models

F.1 Cultural Model



F.2 Workflow Model

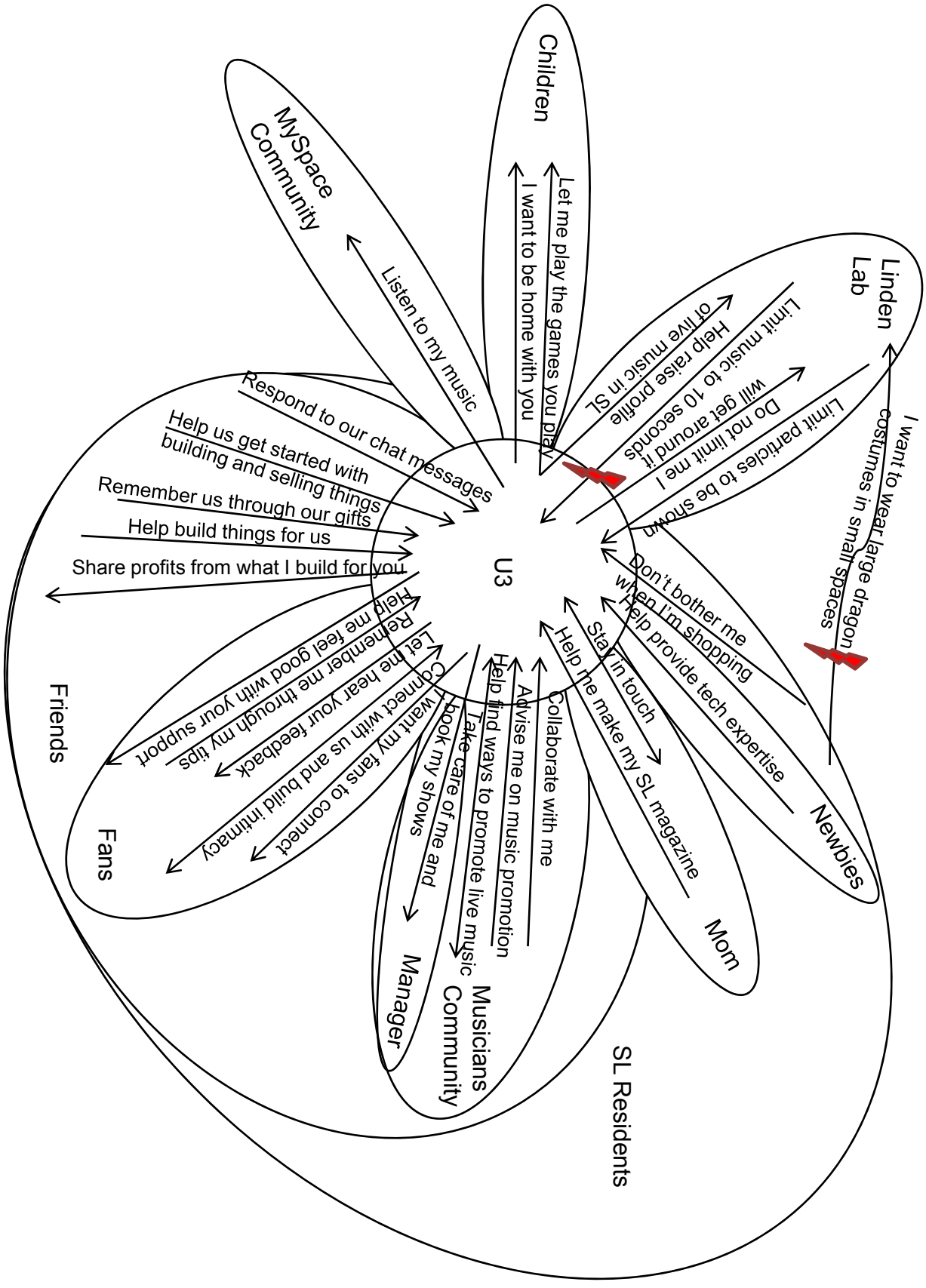


F.3 Sequence Model

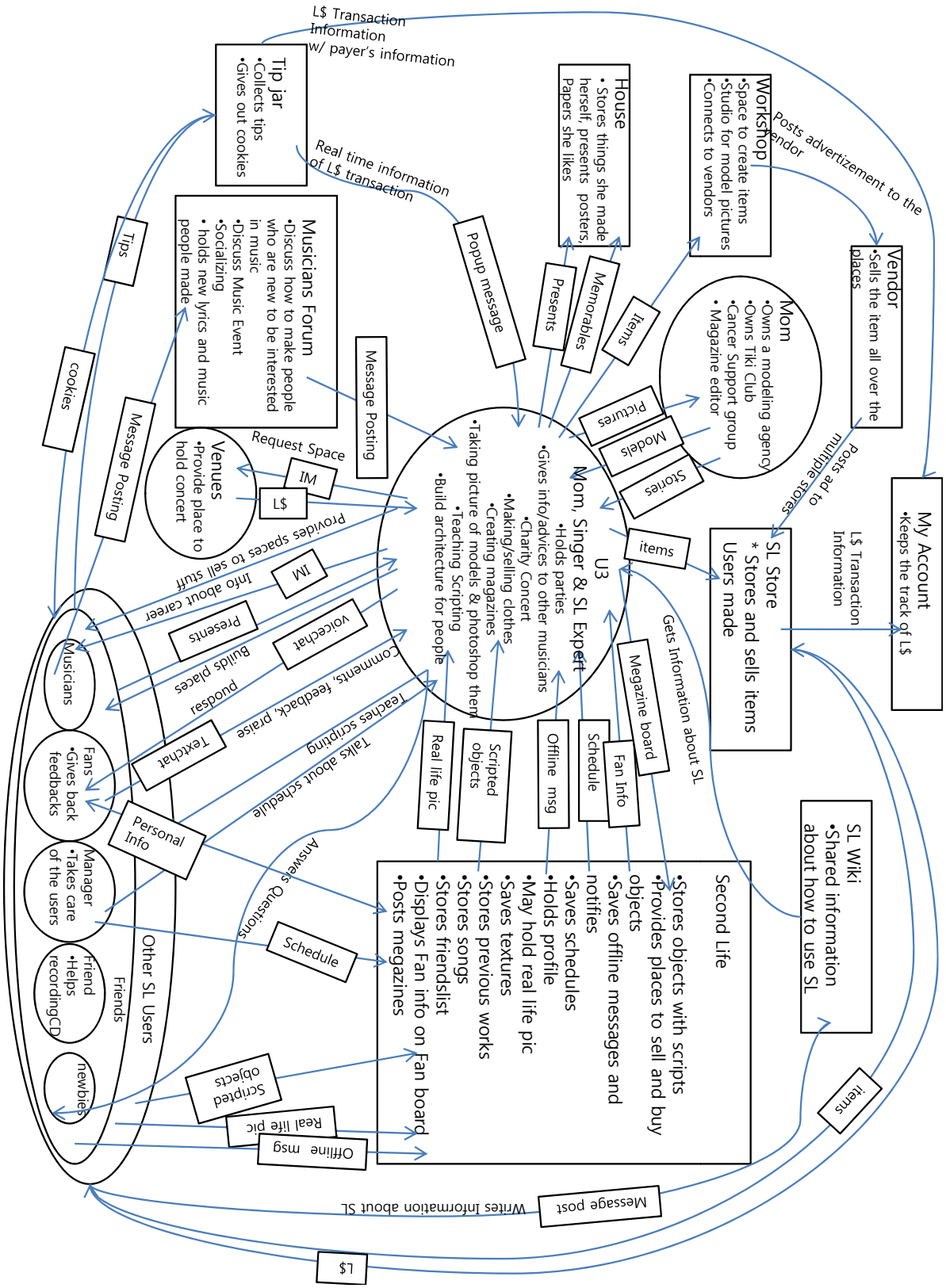
Activity	Intent	Abstract Step
Decide to get on the SN	want to check updates	Trigger: - Part of routine - Email notice from SN - Free Time
Get on to the SN	make it possible to check updates	Go to the SN website Log on
Check updates **Breakdown**	see what the community is doing	Check photo updates Check posts Check news feeds **Too many posts to look at**
Browse network **Breakdown**	Recreational activity	Go to compiled list of information Look at specific information **Cannot find friend**
Get off of the SN **Breakdown**	get off the SN	Log out Exit website **Must crash browser to hide login activity**

Appendix G — Second Life Expert#1 CI Models

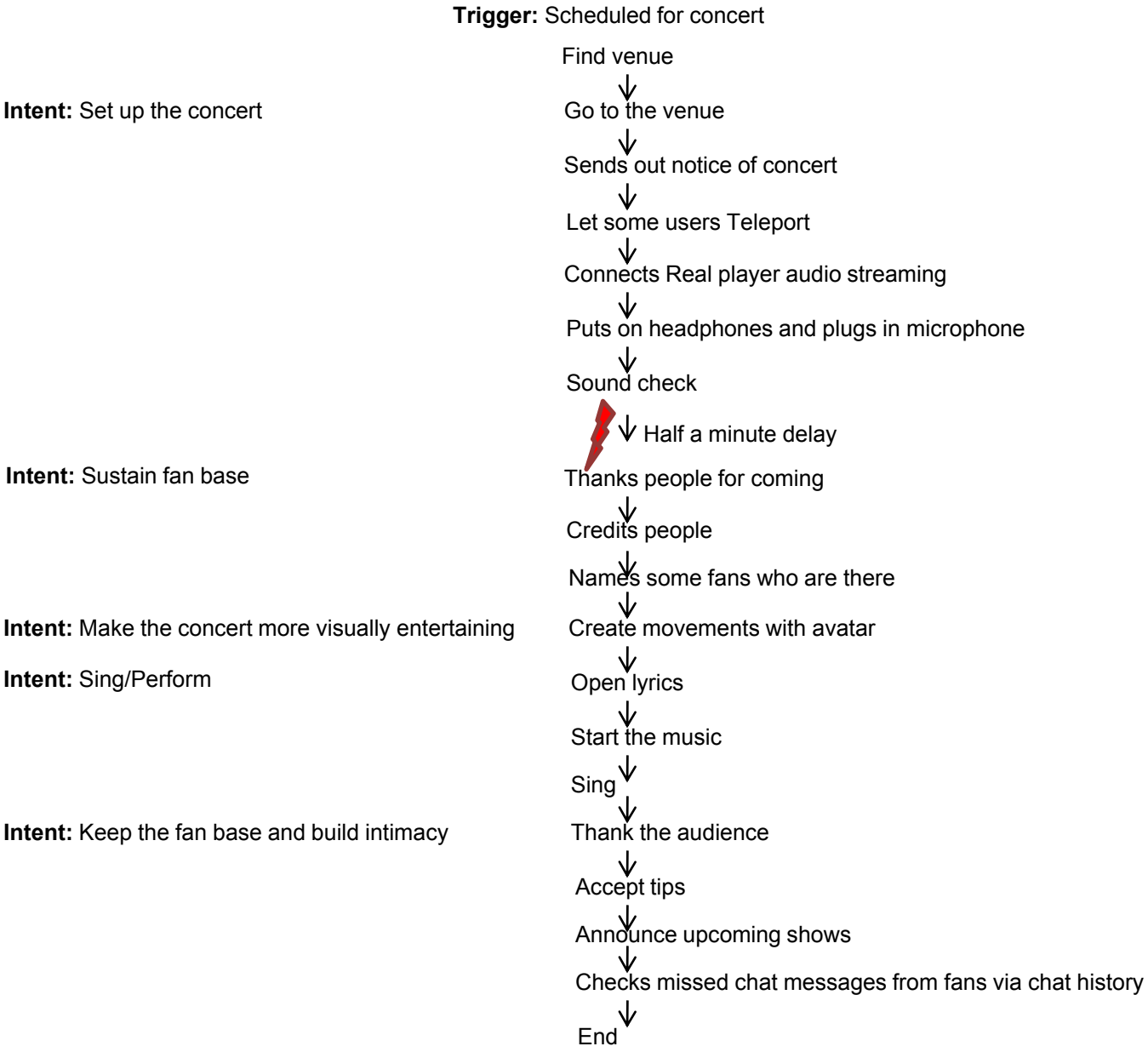
G.1 Cultural Model



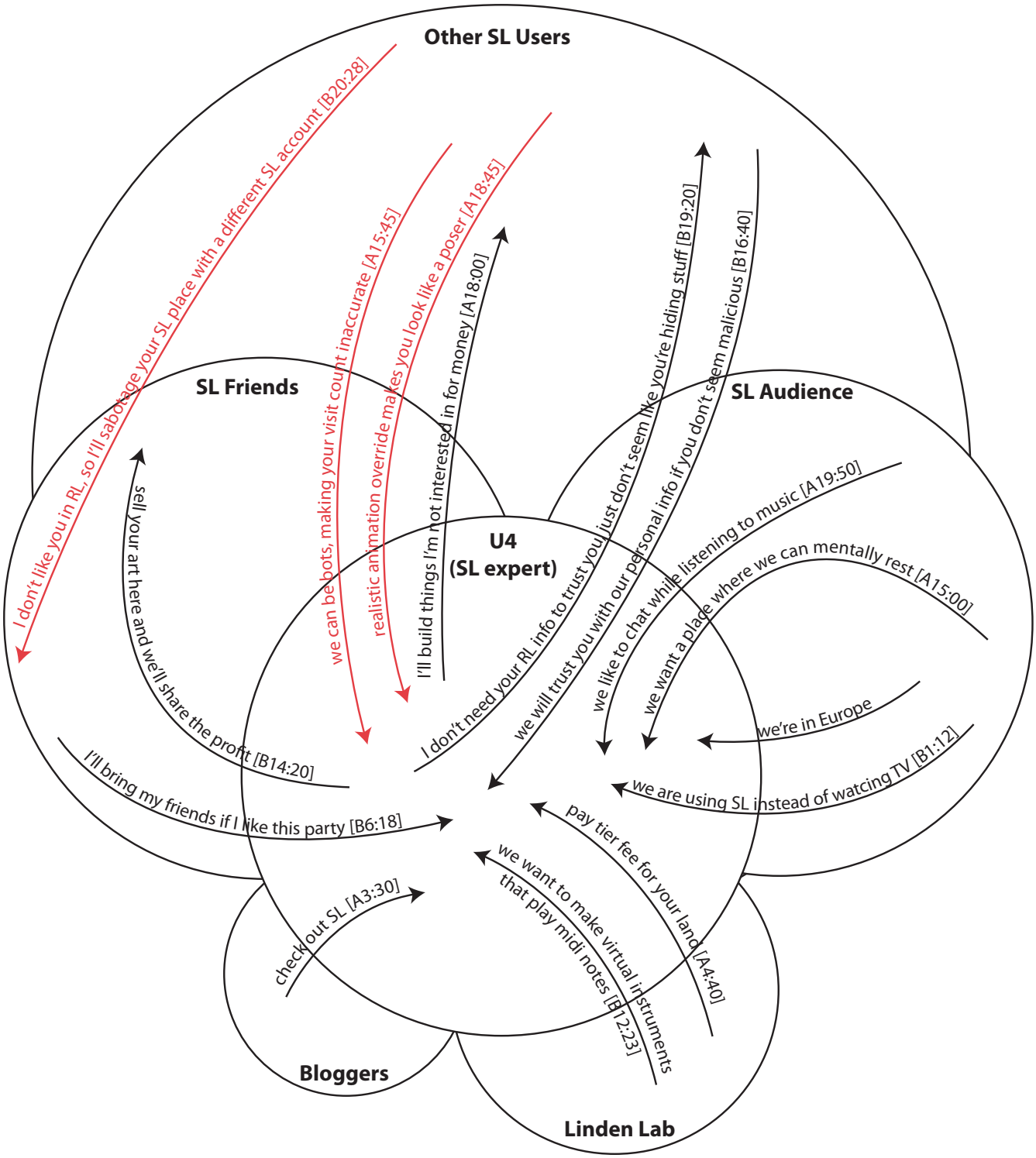
Appendix G — Second Life Expert#1 CI Models
G.2 Workflow Model



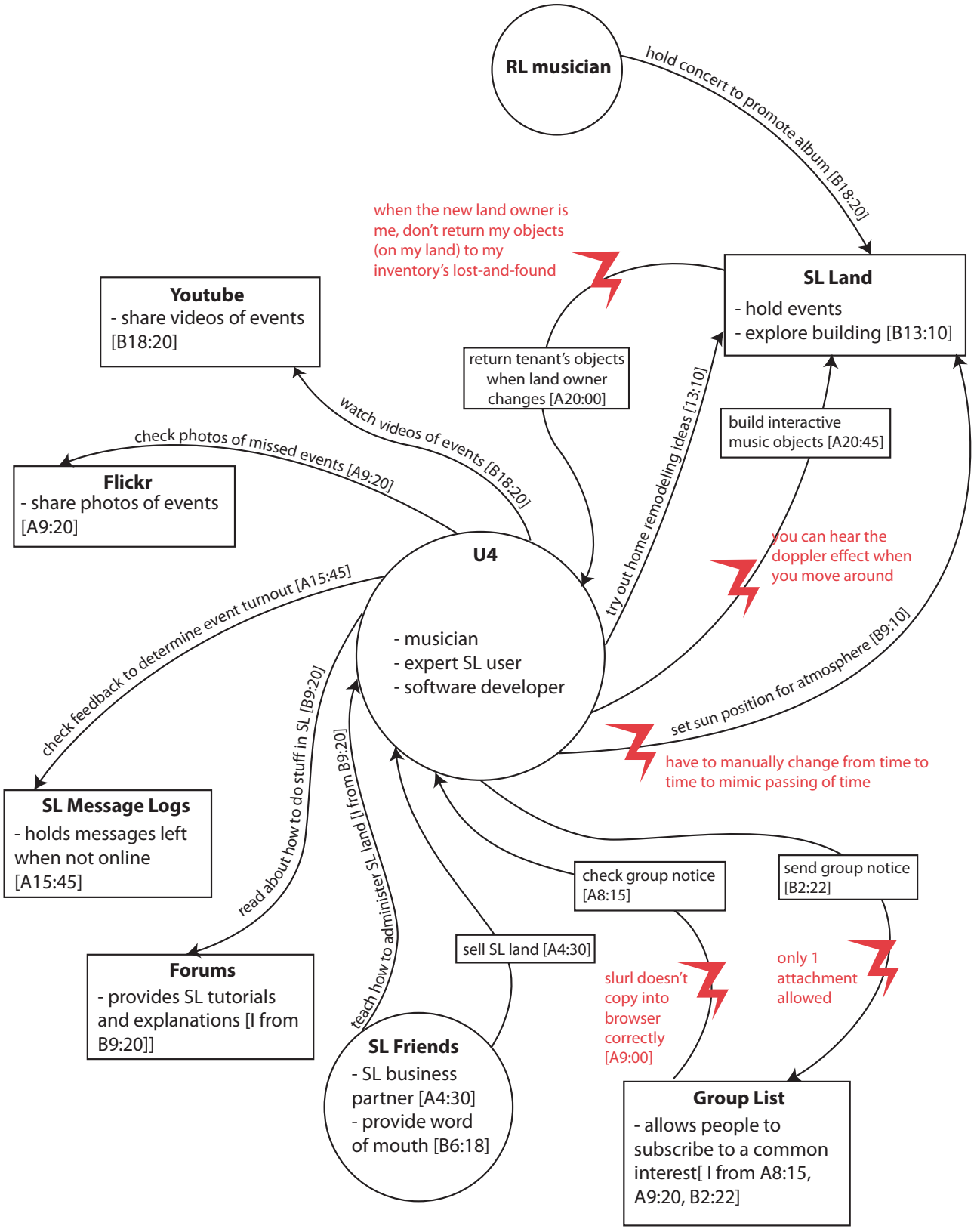
Appendix G — Second Life Expert#1 CI Models
G.3 Sequence Model



Appendix H — Second Life Expert#2 CI Models
H.1 Cultural Model



Appendix H — Second Life Expert#2 CI Models
H.2 Workflow Model



Appendix H — Second Life Expert#2 CI Models

H.3 Sequence Model

Trigger: Friend asks about event in IM **I: Create group notice about event**

```
        ||
        V
Click "Contacts" toolbar button
        ||
        V
Click "Groups" tab
        ||
        V
Select the group
        ||
        V
Click "Information" button
        ||
        V
Click "Notices" button
        ||
        V
Click "Create New Notice" button
        ||
        V
Types subject
        ||
        V
Press tab to focus on message textbox
        ||
        V
Type message
        ||
        V
Click to focus on the world                    I: Attach a slurl of entrance to event notice
        ||
        V
Walk to entrance
        ||
        V
Position camera for a good view
        ||
        V
Click "Map" toolbar button
        ||
        V
Click "Copy SLURL to clipboard"
        ||
        V
Read slurl copied popup notification & Click "Close"
        ||
        V
Close map
        ||
        V
Click to focus on "Group Notification" window
        ||
        V
Type "ctrl+v" to paste SLURL into message
        ||
        V
Click "Inventory" toolbar button                        I: Attach logo to notice
        ||
        V
Type "TERRA" in textbox to search for item
        ||
        V
Scroll down to "Textures" folder and select image
        ||
        V
```

Trigger: See "Dance" object **I: start dancing**

||
V

Click "Dance" object (it's a button mounted on a wall)

||
V

Click on a dance option button

||
V

Click "Yes" for allowing this object to animate you

||
V

Click "Dance" button **I: stop dancing**

||
V

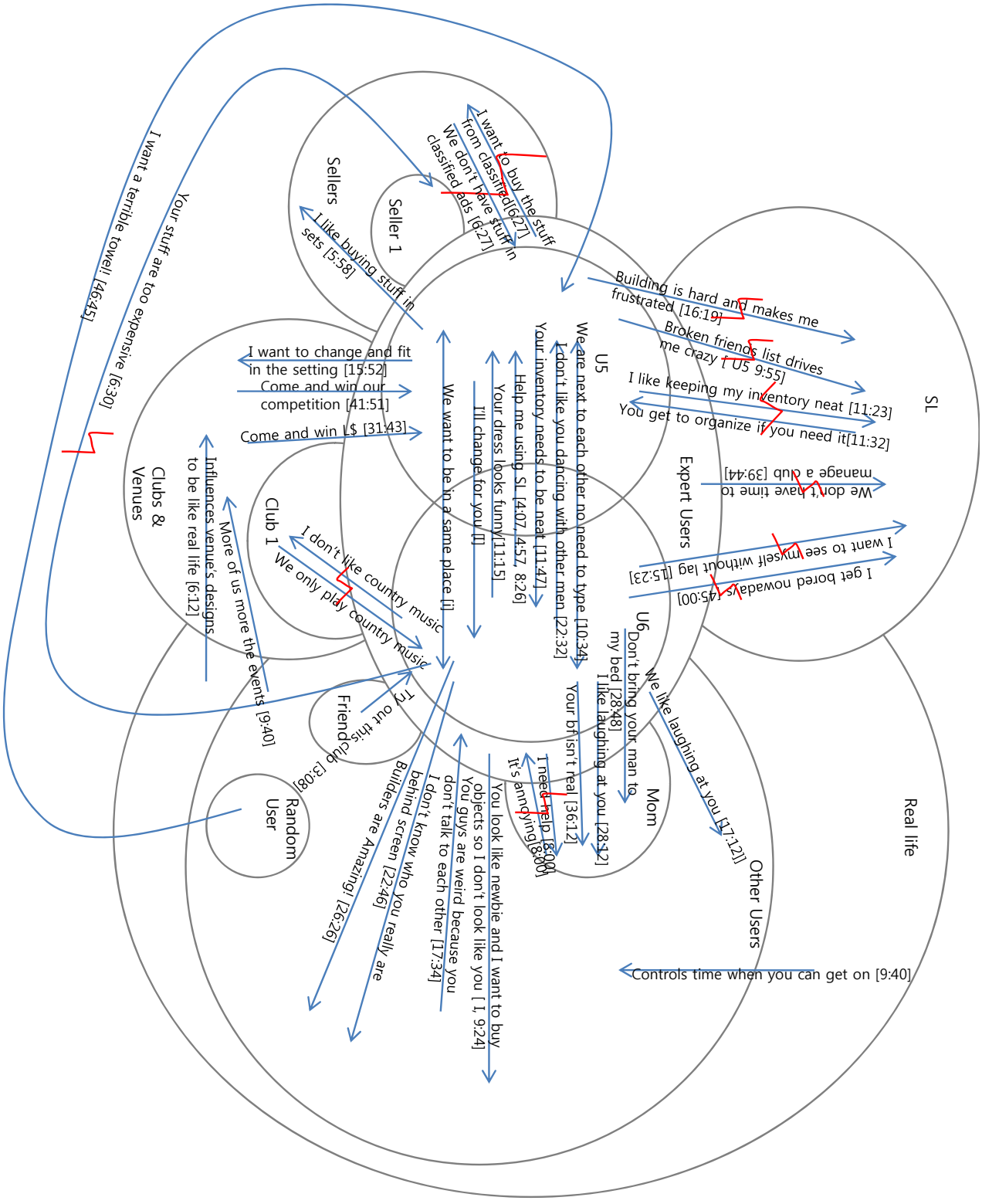
Click "Stop" button

||
V

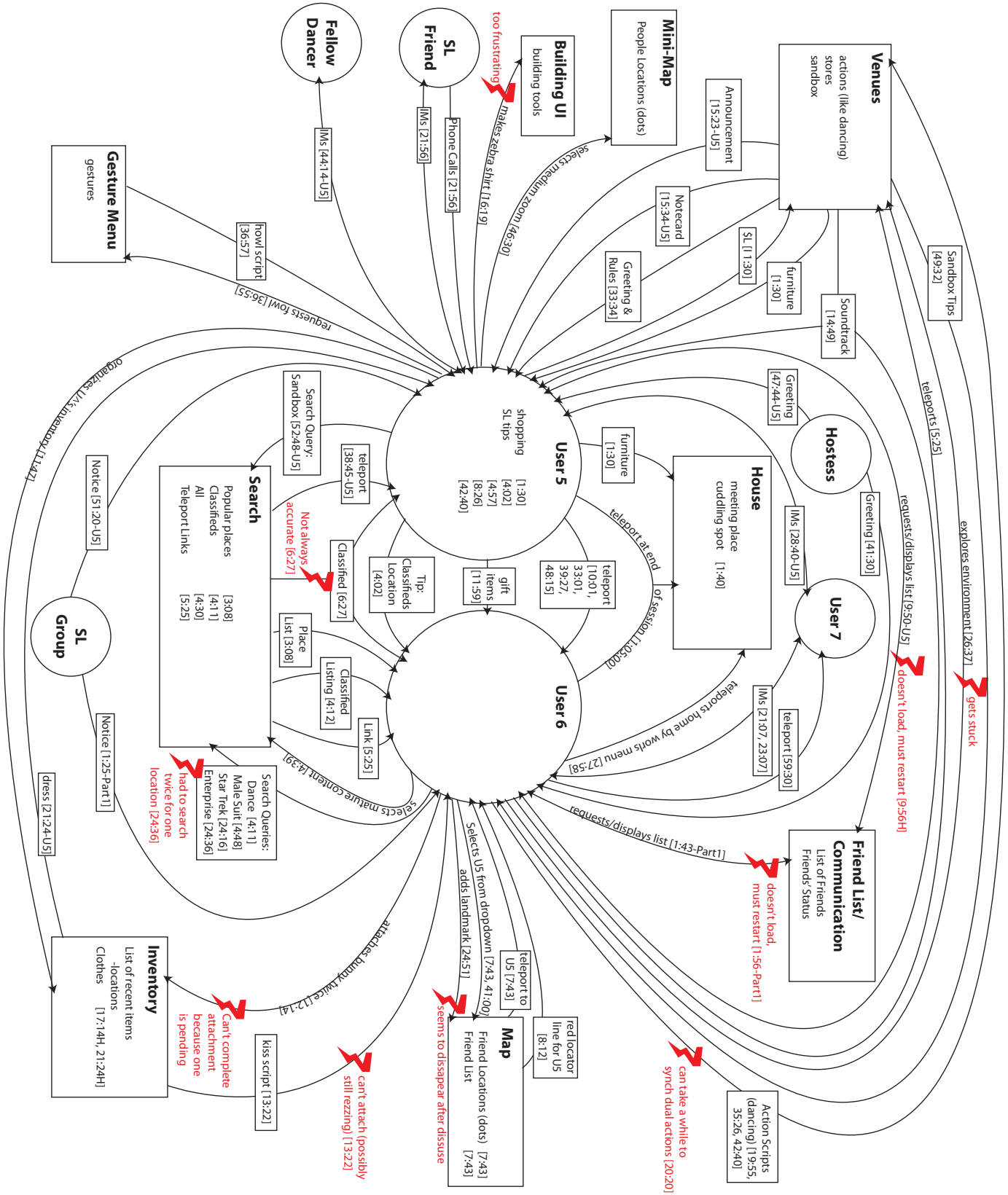
Click "Yes" for allowing this object to animate you

Appendix I — Second Life Experts #5&6 CI Models

I.1 Cultural Model



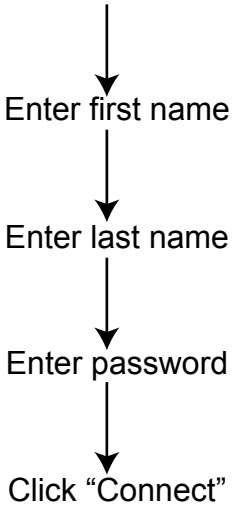
Appendix I — Second Life Experts #5&6 CI Models
I.2 Workflow Model



Appendix I — Second Life Experts #5&6 CI Models
I.3 Sequence Models

Trigger: Routine [e1 00:21]
Task: Logging in

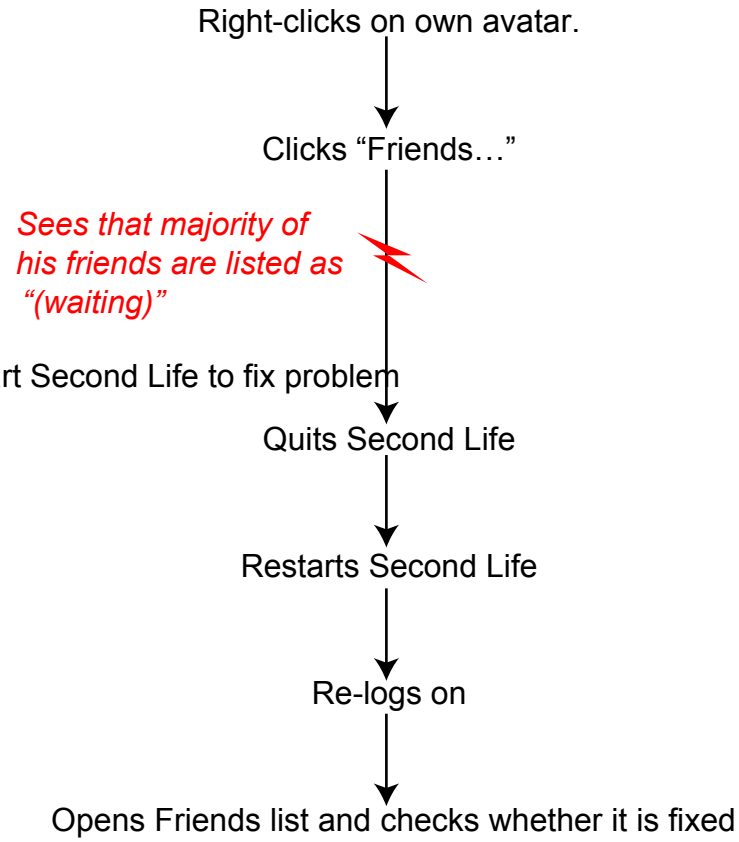
Intent: Plug in



Trigger: Checking to see which of user’s friends is online.
Task: Friends list fails to display friends’ names (just says “waiting”). Fix it

[e1 01:40]

Intent: See who’s online



Trigger: Want to find a new place to dance. [e2 02:59]

Task: Search for a new dancing club

Intent: Find a place

Clicks “Search” from bottom row.

Clicks “Popular Places” tab from “Search Second Life” window and browses through the list.

Clicks on a listing to see more detail about the place.

Intent: Go check out a place

Clicks “Teleport” to go to the place.

Intent: Find more places

Asks U6 how to get to “Classifieds”.

Clicks “Search” from bottom row.

Clicks “Classifieds” tab from “Search Second Life” window.

Searches using query “dance”.

Trigger: Wants a new suit [e2 04:29].
Task: Find a place to buy a suit

Intent: Find a shop

(With the “Search Second Life” window open)
Clicks “All” tab.

Clicks “Include Mature content”.

Searches using a query.

Browses through results list and click on a listing.

Intent: Seek help

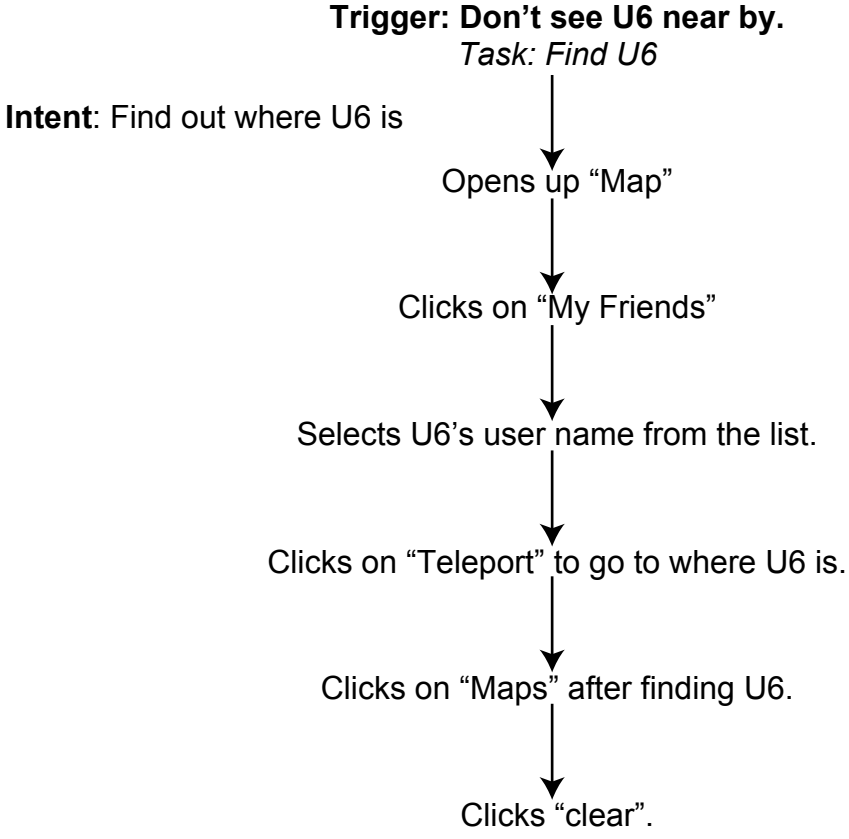
Asks U6 physically where to find a good suit.

Intent: Go to a place

Teleports to a place found through results list.

Note: U5 notes that this is basically how he shops in general.
Same procedure when looking for enterprise [e2 24:40], but no step 5.

!



Note: This happens a lot; U6 says they follow each other around a lot using maps in [e6 08:20]. Same process for talking also [e2 21:00]

Trigger: Like seeing popular place [h 35:48]

Task: Find new places to go to.

Intent: Check out places.

↓

Clicks on “Search”.

↓

Clicks on “Popular places” and just browse the list.

↓

Clicks on “Land Sales”,

↓

Clicks on “Places”.

↓

Clicks on “Events”.

↓

Turns on “Show Mature”.

↓

Clicks on “Search” without any specific search query.

↓

Browses through results list, sometimes going between pages. Clicks on any interesting listing to see more detail in right pane.

Intent: Inform U5

↓

Tells U5 physically anything that he might be interested in.

Intent: Go to a place

↓

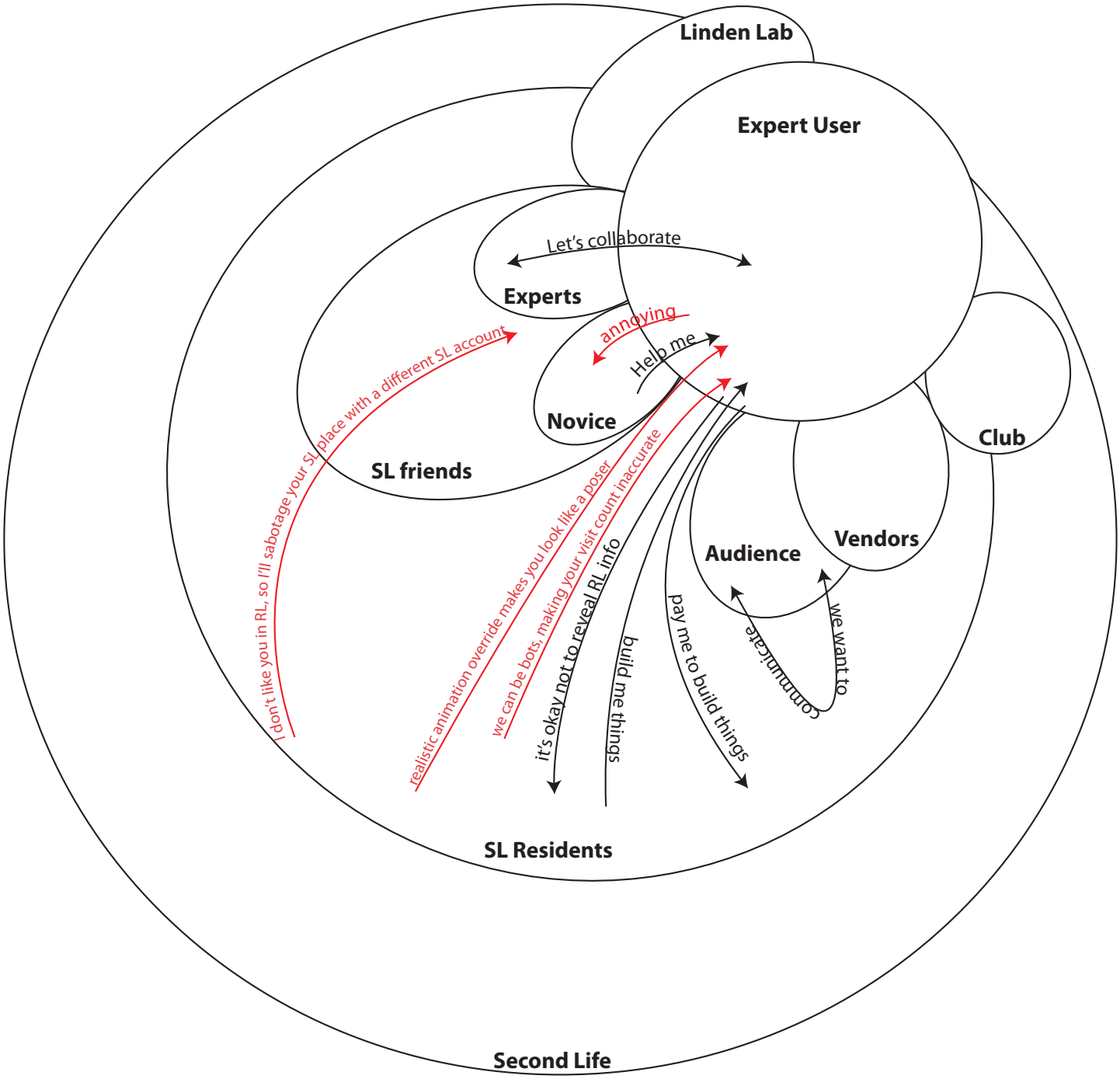
Double-clicks on a listing to teleport.

↓

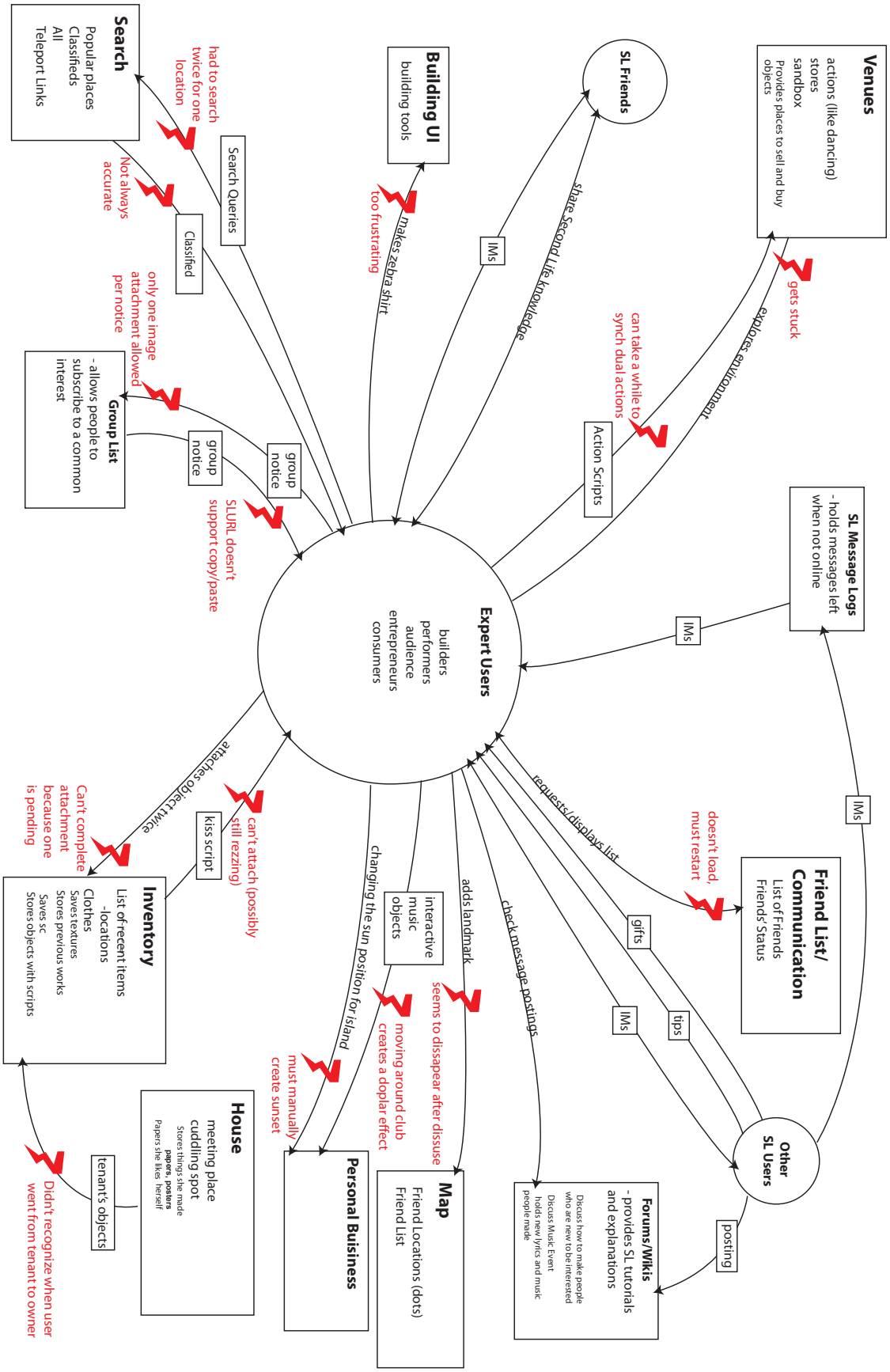
Invites U5 to the place.

!

Appendix J — Consolidated Second Life Experts CI Models
J.1 Cultural Model

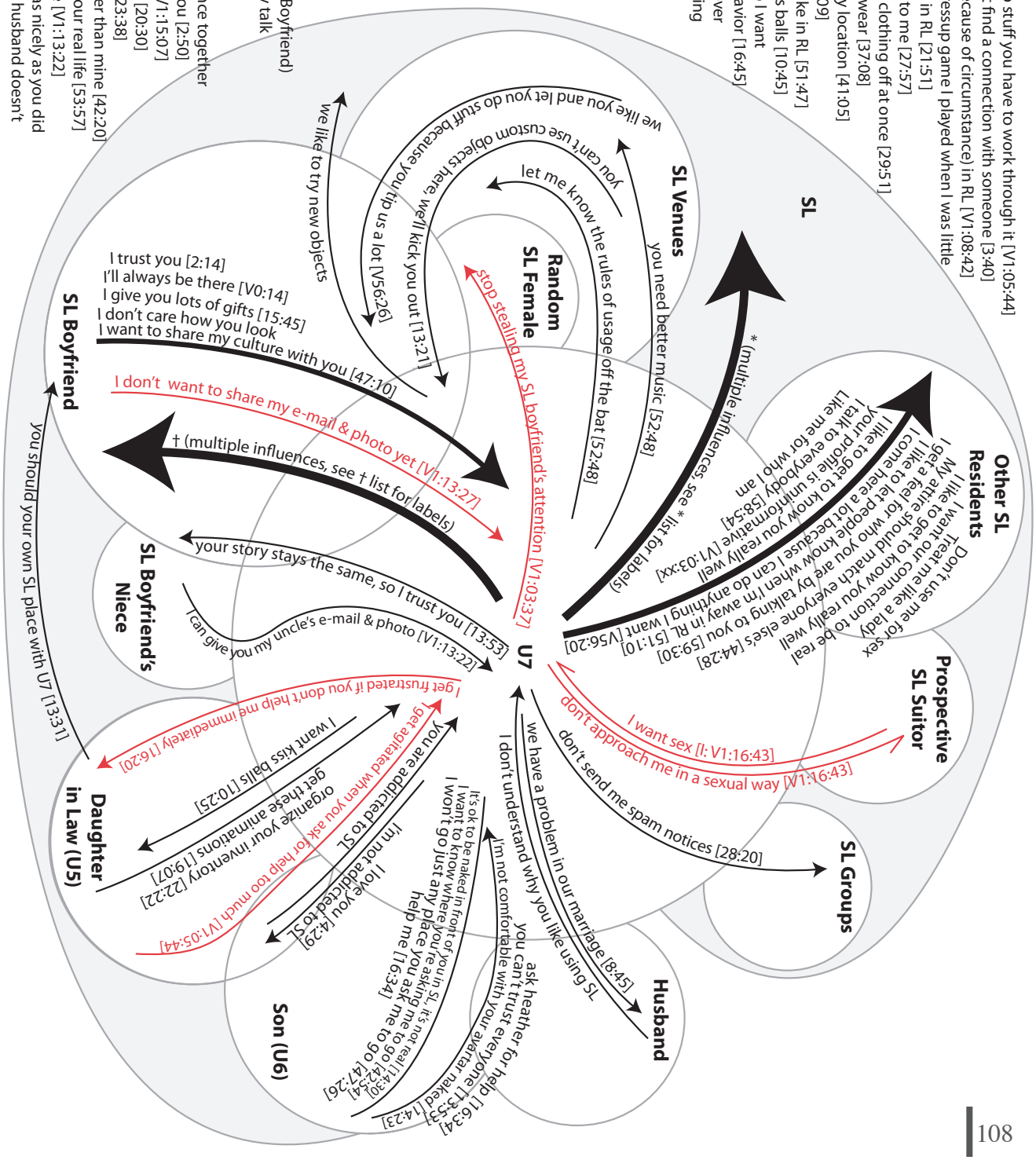


Appendix J — Consolidated Second Life Experts CI Models
J.2 Workflow Model

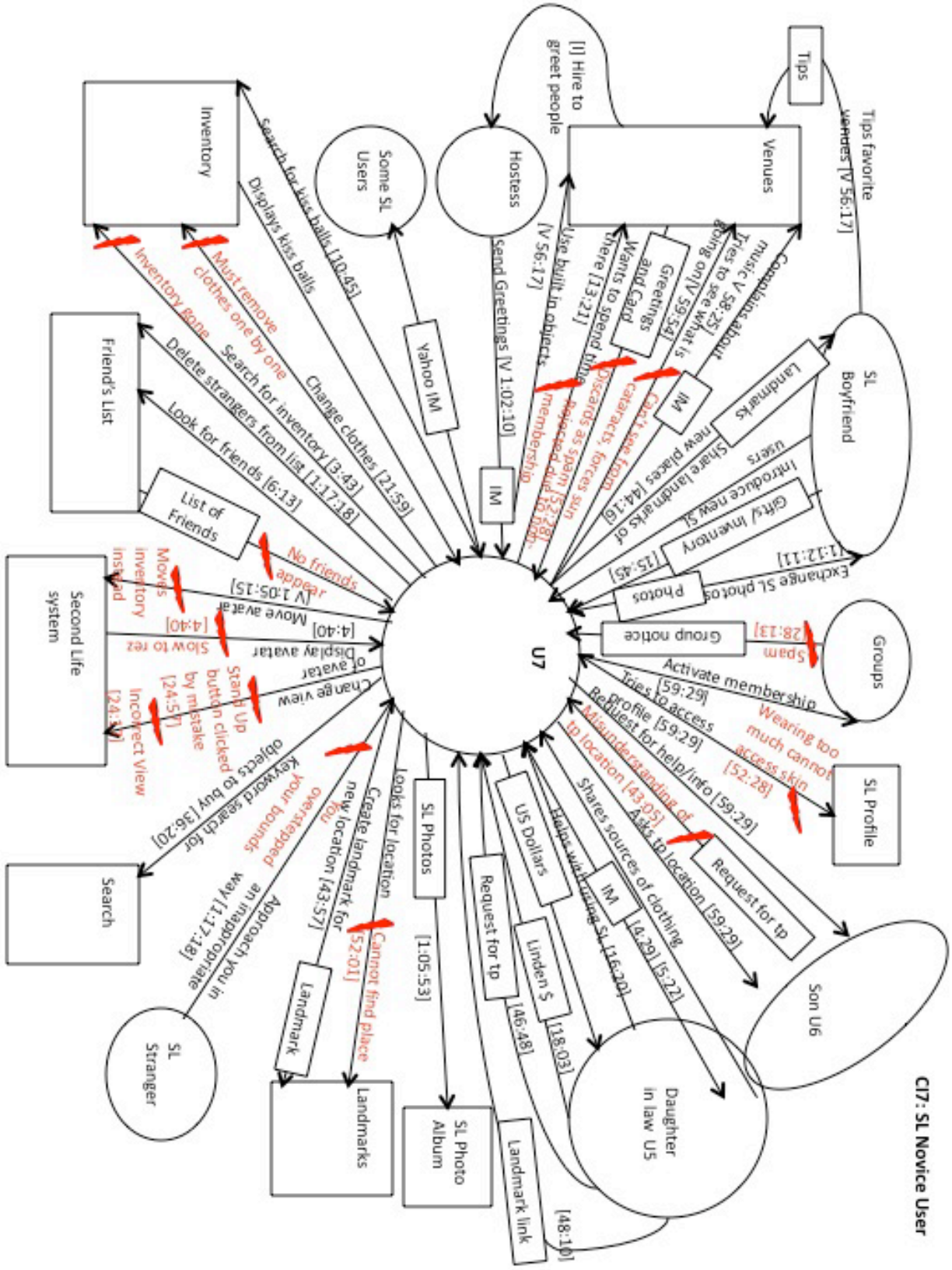


Appendix K — Second Life Novice CI Models

K.1 Cultural Model


* (influences from U7 to SL)
If you don't know how to do stuff you have to work through it [V1:05:44]
I wouldn't be on SL if I didn't find a connection with someone [3:40]
I can do things I can't do (because of circumstance) in RL [V1:08:42]
Reminds me of the paper dressup game I played when I was little
I wear things in SL that I like in RL [21:51]
Objects I buy are important to me [27:57]
I want to be able remove all clothing off at once [29:51]
I want to find something to wear [37:08]
I wear clothes that match my location [41:05]
Everything I do matters [41:09]
I like to do stuff in SL that I like in RL [51:47]
I want to find all kinds of kiss balls [10:45]
I can create any relationship I want
I care about my looks & behavior [16:45]
I want something that's forever
Going on SL is a way of healing
† (influences from U7 to SL Boyfriend)
I like how you don't do dirty talk
we're in this world together
It feels good to be with you
We don't need music to dance together
I want to spend time with you [2:50]
I respect your boundaries [V1:15:07]
I love to kiss for a long time [20:30]
I want to look nice for you [23:38]
I want your avatar to be taller than mine [42:20]
I want to be connected to your real life [53:57]
I want your e-mail & picture [V1:13:22]
No man online treated me as nicely as you did
you give me something my husband doesn't
SL
SL Venues
Random SL Female
SL Boyfriend
SL Boyfriend's Niece
Other SL Residents
Prospective SL Suitor
SL Groups
Husband
Son (U6)
Daughter in Law (U5)
U7
we like to try new objects
we like you and let you do stuff because you're a trip us a lot [V56:26]
you can't use custom objects here, we'll kick you out [13:21]
let me know the rules of usage off the bat [52:48]
you need better music [52:48]
stop stealing my SL boyfriend's attention [V1:03:37]
I trust you [2:14]
I'll always be there [V0:14]
I give you lots of gifts [15:45]
I don't care how you look
I want to share my culture with you [47:16]
I don't want to share my e-mail & photo yet [V1:13:27]
† (multiple influences, see † list for labels)
* (multiple influences, see * list for labels)
I like to get to know you really well
My attire should match you are by talking to you [59:30]
I get a feel for people when I'm away in RL [51:10]
I come here a lot because I can do anything I want [V56:20]
I like to let people know you are by talking to you [59:30]
I like to get to know you really well
I like to connection to be real
Don't use me for sex
Treat me like a lady
I want our connection to be real
I like to get to know you really well
I like to get to know you really well
Your profile is unfortunate [V1:03:xx]
I like to get to know you really well
I like to get to know you really well
I like to get to know you really well

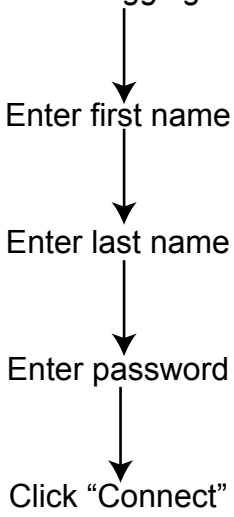
Appendix K — Second Life Novice CI Models
K.2 Workflow Model



Appendix K — Second Life Novice CI Models
K.3 Sequence Models

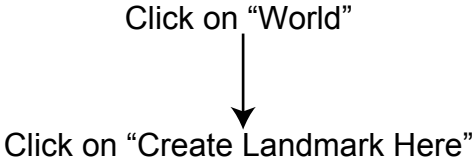
Trigger: Routine
Task: Logging in

Intent: Plug in



Trigger: I’ve never been here before (B 43:48)

Intent: Be able to share it with another user later



U7

Trigger: Wants to show inventory

Task: Change appearance of avatar [b 23:50]

Browse & find a piece in inventory.

Intent: Try different appearance until satisfied

Put on the piece.

Right click on a piece already worn and detach it.

Right click on avatar.

Click on “Take Off”.

Click on “Clothes”.

Click on “More”.

Right click on avatar.

Click on “Take Off”.

Click on “Clothes”.

Click on “Shoes”.

Right click on avatar.

Click on “Take Off”.

Appendix L — User 1 UARs

No. ***EJR -TA-1***	**Problem/Good Aspect:** Problem
Name: Lag of rendering causes confusion on the understanding of environment	
Evidence: [EJTA-2:46] The user flies around, saw a shop's interior from the top of the building, thought of going in, however, hesitated with a little surprise and flied back when the top part rendered and showed it's not an entrance [EJTA 22:45] the resident suddenly disappeared as things gets rendered	
Criterion: 6. The user expresses hesitation, surprise.	
Explanation: The rendering takes longer than the speed of the user flying around, which gives false sense of the opening of buildings. Such leads the user to believe he could use that particular opening to get into the building, however, gives a little surprise when it finally renders and closes, which causes the user to hesitate and think how else he should get into the building, which in this case, he figured he is not interested enough to find another entrance so he flied away from the building	
Severity or Benefit: ***Rating:*** 2 –Minor **Justification (Frequency, Impact, Persistence):** ***Frequency:*** High. This happens all the time and everywhere. ***Impact:*** Medium. This does not interfere with functions, other than having invisible walls. It does not confuse the users too much. However, this could be a driving away factor from the user to visit the places ***Persistence:*** Low. The users learn to deal with lagging after a short period of SL usage, and they get to understand that invisible wall effect means just that things aren't rendered yet. ***How these factors are weighted and why:*** While the frequency is high, the users get to deal with this effect, and it does not really interfere with the user's interaction with the world itself. However, it does drive people away from interacting with certain landmarks.	
Possible solution: Have more servers, make things render faster	
Possible trade-offs: The SL is growing and it's going to be expensive to have more servers.	
Relationships:	

No. ***EJR -TA-2***	**Problem/Good Aspect:** Problem
Name: User Confuses Inventory box as Search box	
Evidence: [EJTA-2:00~ 3:30] "I click the search..[clicks inventory box] and type golf" - 2:05 [explores around] "[what I am currently doing] is not finding golf…"[clicks inventory box again and types] – 3:00 [still looking at the inventories] "There's pants…" – 3:48 [found search] mmm.. events? – 3:59 goes to search all types "golf" – 4:09	
Criterion: 2. The user articulates a goal, tries the same thing over again	
Explanation: The user was confused between the inventory box and the search box, and keeps on searching in the inventory box a golf course. He tries this 3-4 times meanwhile very confuses but exerts the confusion by driving away from the task itself and exploring the world around, and then realizing that he still needs to complete the task, so comes back to the inventory box, searches again. After three or four times (in 2 minutes) he has done this, he finally reads the title of the box which says inventories, and sees search button at the bottom of the screen, which finally he presses and successfully finds the golf course.	
Severity or Benefit: ***Rating:*** 3 - Major **Justification (Frequency, Impact, Persistence):** ***Frequency:*** Medium. This confusion seems to happen to some users. ***Impact:*** High. This interferes with people trying to find something to do, and causes frustration with the Second Life itself. ***Persistence:*** Low. Once the users figured it out, they don't find it troubling to find the search function any more. ***How these factors are weighted and why:*** While the persistence is low that once users get over this problem, they won't find it troubling anymore, its impact is high and makes the users frustrated with the entire interface. Also causes the users not to be able to find something to do, will make the people feel bored. And it affects good number of new coming users.	
Possible solution: Have the inventory less visible, and have the search field in the inventory not to look like search box. Have title of the search box more prominent.	
Possible trade-offs: The inventory is more accessed than search by some people. Inventory may be needed to be out there and search box needs to be there within the inventory box. But there should be an obvious distinguish between inventory and search.	
Relationships:	

No. ***EJR -TA-3***	**Problem/Good Aspect:** Problem
Name: User expects more people to be around but the place is empty	
Evidence: How come there is no people around here [EJTA 3:13]-	
Criterion: 7. The user expresses some negative affect or says something is a problem.	
Explanation: The user expected there will be more people in the Second Life and its events. However, the user is confused when there were not many people around, and the world was empty.	
Severity or Benefit: ***Rating:*** 4 - critical **Justification (Frequency, Impact, Persistence):** ***Frequency:*** Common. This happens in many places, in certain hours where people do not log in.. . ***Impact:*** High. It causes the user bored and drives them away from Second Life ***Persistence:*** High It can't be really overcome unless they transport to other popular places. ***How these factors are weighted and why:*** It happens a lot of the time in many places the new users go in Second Life. This causes the people to feel bored and drives them away from using the Second Life. And people will have to move one place to another to find a place with more people, and that's just by luck – and thus it's hard to overcome.	
Possible solution: Give an indication how many people are at each given location within search results, and popular places choices, so people will have certain expectation how many people are participating within the event or the world itself. I	
Possible trade-offs: Clustered information within the search.	
Relationships:	

No. ***EJR -TA-4***	**Problem/Good Aspect:** Good
Name: User learns flying very easily	
Evidence: I can jump [2:17] [flies] Woohoo [2:25] Flies to move to the front of cabin door from the golf course [5:08]	
Criterion: (added) User learns optimal way	
Explanation: Instead of walking around which is slower way of exploring, the user finds out by himself how to jump and fly around so he can explore the world in quicker, optimal ways.	
Severity or Benefit: ***Rating:*** 3 – Major Flying saves a lot of time of world exploration for the users, and it is critical for the beginner users to learn this function because they are the ones who will be in the need of explore a lot more. Having this intuitionally accessible is a good design.	
Possible solution:	
Possible trade-offs: There is no possible trade offs	
Relationships:	

No. ***EJR -TA-5***	**Problem/Good Aspect:** Problem
Name: The user finds interacting with objects not intuitional	
Evidence: I don't know how to interact with anything [5:24]	
Criterion: 7. The user expresses some negative affect or says something is a problem	
Explanation: User is in the golf shop, and he walks around to find a way to golf, probably looking for place to lent club and ball like he does in the real world. He, however, expresses that he doesn't know how to interact with anything and does not try to do so in anyways.	
Severity or Benefit: ***Rating:*** 3 – Major **Justification (Frequency, Impact, Persistence):** ***Frequency:*** Common. This happens to novice users a lot. ***Impact:*** High. It causes users confused and frustrated. ***Persistence:*** Medium. People figure things out some point, however, there is a big complexity differences depending on objects, and people will have to learn again and again. ***How these factors are weighted and why:*** It happens a lot to the users, and the impact is high. It causes boredom, frustration, and confusion because the users expected more interactive world. Also even if they learn how to generally interact with the objects, they have to learn whole new level of interaction method for different objects, and it makes the interaction with Second Life not so pleasing.	
Possible solution: Make interaction with objects simpler, and more graphical than the current text based notes that is given.	
Possible trade-offs: Takes away too much space within the notes that is given with the products, and takes too much space within memory within already huge Second Life	
Relationships:	

No. ***EJR -TA-6***	**Problem/Good Aspect:** Good
Name: User successfully finds a way to talk to the people around	
Evidence: **"Communicate" – EJTA6:12** **Clicks local chat tab – EJTA 6:19** **Types in immediately**	
Criterion: (added)The user expresses his goal and completes it successfully in optimal way	
Explanation: User was approached by another user in the golf shop, and he wanted to say hi back. So he finds the communicate button (after some exploration of the buttons at the bottom) and explores the buddy list that pops up first, but finds the local chat tab almost immediately after exploration of the buddy list tab. After having the tab opened for the local chat, he typed in his responses back to the other residents right away.	
Severity or Benefit: ***Rating:*** 4 – Critical Communication with other users is also a big thing that beginner users are interested and this is critical that it should be intuitional. The user in this think aloud study found this intuitional, and easy to see, which is critical point of what makes him feel easy to talk to other people and enjoy this experience.	
Possible solution:	
Possible trade-offs: There is no possible trade offs	
Relationships:	

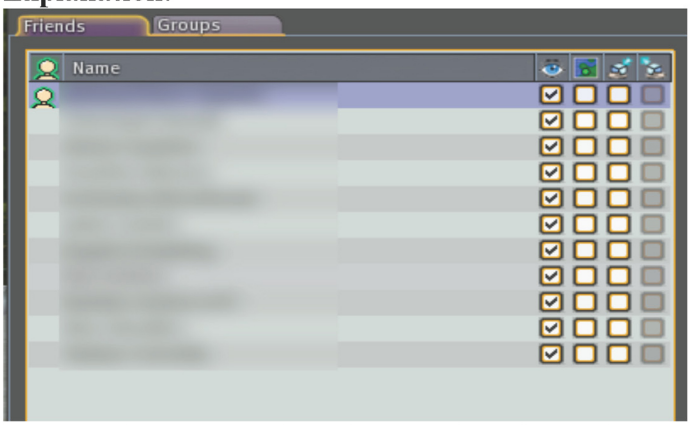
No. ***EJR -TA-7***	**Problem/Good Aspect:** Good
Name: User communicates with others to complete task	
Evidence: **"I want to play golf!" – 6:41** **"I.. need to practice first" – 6:51** **The residents takes him out to the place with explanation – 6:58~ 7:05** **"[types in] Where r u?" – 19:29**	
Criterion: (added)The user succeeds to accomplish his goal in optimal ways	
Explanation: The user decides to use the friendly people who started to talk to him to find out more about the golf course that he is interested in-which is an optimal way, instead of just explore and find out how things work- which will be a suboptimal way. Also the residents who he communicated with were very friendly and willing to help him out that they took him out to the golf course, and showed him where he can find all the information about how to play, and were willing to help him learn how to golf in second life, which the user later expressed after the study his surprises on how it made him feel like he's at a nicer part of internet community. Also in the later tasks he figured it would be quicker to ask the user where the person is instead of trying to find her on the map, which is indeed an optimal way.	
Severity or Benefit: ***Rating:*** 4- critical The people who are knowledgeable in the activity field, being willing to help the obviously new users, is some serious benefit on the new users who do not know how to do things, also to create bond between the new user and the second life community itself. This causes good first impression of the experiences that new user goes through when they start to explore and find things to do.	
Possible solution: Have some experts or robots who helps the new users kindly in these activity spots	
Possible trade-offs: Robots are impersonal, and costs a lot to have a good AI to make it sure it interacts in nice way with the users without frustration. Experts to stay around will require some cost. There are so many new places rising and not all of these places will be in the state of having these experts or robots.	
Relationships:	

No. ***EJR -TA-8***	**Problem/Good Aspect:** Problem
Name: The people in SL do not seem real	
Evidence: **"So.. are these real people or .." EJTA7:00** **"..Crazy" EJTA 7:02**	
Criterion: 6. The user expresses hesitation, surprise.	
Explanation: User was not exactly sure that if the people that he just interacted with are real people	
Severity or Benefit: ***Rating:*** 1- aesthetic **Justification (Frequency, Impact, Persistence):** ***Frequency:*** Medium. We saw this confusion in different TA's as well ***Impact:*** Low. It may cause the new users to not to talk with the other users, or may cause the users to feel more comfortable talking to other users. It does not really affect the interaction in general. ***Persistence:*** Low. People realize that what they are seeing are real people pretty quickly. ***How these factors are weighted and why:*** While the frequency is medium, people find it out very quickly that these are the real people, and do not get confused any more. It does only a little impact on how they interact with others, and it sometimes makes the interaction better because new users thought they were robot, and didn't feel discomfort of talking to them	
Possible solution: Give an introduction in the beginning of the usage, telling them, everyone are real.	
Possible trade-offs: May cause people to feel uncomfortable in the first interaction afterall.	
Relationships:	

No. ***EJR -TA-9***	**Problem/Good Aspect:** Good
Name: User finds event successfully	
Evidence: **8:13 Search… event..** **8:26 What kind of event would [I] like..** **[explores around the type of events, text searches wedding then looks at popular, then looks at categories]** **10:17- 10:34 Education..oh my goodness (surprised by sexually explicit listings)… Second life explore!** **10:34 reads through the description** **10:42 Teleport to that.. that's gonna be a fun event.**	
Criterion: The user successfully accomplish a goal.	
Explanation: Once the user figured out how to use the search from first few minutes of confusion, he was able to search event very quickly. He explored around to figure out what is available, and found something that he would be interested in and went into the event place without any problem with hope that it is a good event.	
Severity or Benefit: ***Rating:*** 3- major Having this task done without problem is a good thing for the new users who are in the stage of exploring what type of stuff to do. Also it is good for the old users who are more into different types of events, and in the need of search through things.	
Possible solution:	
Possible trade-offs: The events do not show the popularity of the event that the user who was hopeful about this being a fun event, may be disappointed after the arrival. However, searching for another event being easy, he will find another one which may have more people, quicker.	
Relationships:EJ-TA-3	

No. ***EJR -TA-10***	**Problem/Good Aspect:** Problem
Name: User didn't have any guidance on how to be in the event	
Evidence: **[looking at note card given with instruction] "what's this?..discard.. I don't care" 10:56** **11:23- explores the island a while** 11:42 "so.. I haven't found the event yet haven't I?" 12:00 uses map within the search to find where exactly the event is 12:53 [interacts with an advertisement] so is this event? 13:16 [interacts with the portal] okay.. I got it.	
Criterion: 4. The user accomplishes the task in suboptimal way	
Explanation: Event places gives out note card to make sure the user understands how to do the events. However, not exactly knowing what these are, the user discards the note card immediately. And he goes away from the event portal and end up being confused. He then uses map to realize he has to go back to where he landed, so he does, and finally finds the event	
Severity or Benefit: ***Rating:*** 4 - catastrophy **Justification (Frequency, Impact, Persistence):** ***Frequency:*** Common. Many users do not like pop up and throw all these important messages away.. ***Impact:*** High. It causes the users to not know what they are supposed to do in an event, and creates confusion, and frustration. It's hard to find the instruction again for new users – they won't know it was an instruction first of all, so they will think there was no instruction, and they also will have to come back to island again to get the instruction or find the booth with instruction which is not very intuitional for them. ***Persistence:*** Medium. The users may keep throw away things like this, or they might finally realize that these are indeed instruction and decide to read them. This problem even may go unnoticed. ***How these factors are weighted and why:*** The frequency and impact is high, especially for the new users. And the persistence may be high for some of the users. The people get frustrated when they thought they found something to do and can't figure out how to do things, and they will get confused. This is one of the driving away factor of Second Life, that people did reported either it's hard to use, or it's not fun.	
Possible solution: Not have the explanation of event in advertisement looking pop up that only may annoy the people who do not know about this. Use big bulletin board visible to the user when they land to the event which tells the user explicitly "how to participate the event"	
Possible trade-offs: May not be as pretty as it is by using info boxes, and may frustrate users who has been to this place several times, because they know how to do this already and they don't need to be reminded all the time.	
Relationships:	

No. ***EJR -TA-11***	**Problem/Good Aspect:** Problem
Name: Searching user is not that easy	
Evidence: **"Undercroft.. [sees a lot of Undercrofts].. Marilyn..[adds the name Marilyn next to undercroft which do not return result] did I spell it right?" 14:55** **[Types in Marilyn] 15:04** **Did I spell Marilyn right? 15:30** **I don't see the name you told me 15:54** **These[pages] are all the same 16:30** **Howcome I can't find any… did I type in the name wrong… I can't find it 16:49** **[Finally found it] Howcome it didn't find it when I typed it in? 17:00**	
Criterion: 4. The user accomplishes the task, but in a suboptimal way.	
Explanation: The user first typed Undercroft Marilyn expecting to find Marilyn Undercroft, and it didn't give him the result. Then he checked the name several times to make sure he typed the name correctly, and then later decided to find Marilyn Undercroft within all the Marilyn there is in the Second Life. He could not see the next and back button for a while, and thought that one page list, which was in alphabetical order within the page itself, was all the Marilyn there was, and got confused why her name is not there. Then he found the next button, which changed the page, but he didn't see the difference because it's again alphabetically arranged within the page again, with random names.	
Severity or Benefit: ***Rating:*** 2- minor **Justification (Frequency, Impact, Persistence):** ***Frequency:*** Low. Usually people search the full name with first name first, and do not run into this problem ***Impact:*** Medium. When people do not realize that they typed the name wrong way, people will be frustrated to figure out what had gone wrong. ***Persistence:*** Medium. Such problem may go unnoticed. Since not many times people would search wrong name. But usually people will figure it out. ***How these factors are weighted and why:*** While impact and persistence are medium, its frequency is low, and, there is back up ways to find the name just like this user had done. While the backup way is very frustrating within itself.	
Possible solution: Let it be not exact search, but word search, every names that has Marilyn and Undercroft will show up regardless the position of it. Also have the list of the people show up in alphabetical order within the entire database.	
Possible trade-offs: No trade off.. This is a standard thing.	
Relationships:	

No. ***EJR -TA-12***	**Problem/Good Aspect:** Problem
Name: icons in the buddylist are not intuitional	
Evidence: **I don't know what these buttons do, it doesn't tell me what they are – 18:55**	
Criterion: 7. The user expresses some negative affect or says something is a problem	
Explanation:  User , while trying to find where his friend is on Second Life, tries to find a button within the buddy list that would show where the friend is, however, the buttons were all pictorial icons and the graphic of the icons were not very intuitional to the user.	
Severity or Benefit: ***Rating:*** 2- minor **Justification (Frequency, Impact, Persistence):** ***Frequency:*** Common. This confused most of the new users who started to interact with Second Life. ***Impact:*** Medium. The user may be able to see the notes when the mouse rolls over, but many users do not bother to find out what these icons are. ***Persistence:*** Low. When they feel the need of it they will find out how to use it by scrolling over the mouse on the picture to figure out what they are. ***How these factors are weighted and why:*** While the persistence is low, it not showing what they really mean at the first look, causes the users to not to think about these functions' needs they could use for their privacy protection. Thus the impact is somewhat high.	
Possible solution: Make the icons more visible, or use text	
Possible trade-offs: Clusted screen of buddy list. Finding universal icon pictures is hard.	
Relationships:	

No. ***EJR -TA-13***	**Problem/Good Aspect:** Problem
Name: The user expects the friends' location to be available	
Evidence: **"I can't click on find on map" – 20:23** **"It says, it's not.. it doesn't give me an option to find on map" 20:27** **"But how come it could not find her on the map?" 22:14**	
Criterion: 6. The user expresses hesitation, surprise.	
Explanation: Due to lack of knowledge of what kind of privacy settings are available for the users, the user do not understand why "find on map" button was not available to him, which is due to the other party who didn't specify "find on map" to be available –which is default - for her friends.	
Severity or Benefit: ***Rating:*** 2- minor **Justification (Frequency, Impact, Persistence):** ***Frequency:*** Common. Most users do not know all the privacy settings available to them and gets confused when they cannot do it.. ***Impact:*** Low. The users can just ask by messaging where their friends are at. ***Persistence:*** High. The users may never know about this feature and be very confused about it until some critical moments. ***How these factors are weighted and why:*** While the persistence is high, there's very easy way around it, and people will prefer to communicate with each other this way to teleport each other to the spots each other is at. So there's not a severe problem.	
Possible solution: Make the privacy setting icons more visible and available.	
Possible trade-offs: Clustered screen	
Relationships: EJ-TA-12	

Appendix M — User 2 UARs

No. ***JJ-TA-1***	**Problem/Good Aspect:** Problem
Name: Cannot walk	
Evidence: The user tried left and right clicking on the 3D environment to walk, then search the toolbars for how to walk, finally discovering it when she accidentally did not hold down the fn key for page up/down and saw the avatar move forward. The user also expressed frustration and commented "This is not fun…"	
Criterion: 1. The user articulated a goal and does not succeed in attaining that goal within 3 minutes (then the experimenter steps in and shows him or her what to do--the next step). 7. The user expresses some negative affect or says something is a problem.	
Explanation: The first used to mouse to interact with objects near her, and found "move to…" command when right-clicking on a person, so she expected to be able to use the mouse to walk. She also expected more directions as to how to walk and do things in general. After a few tries, she hovered over all the bottom toolbar buttons to read them for walking directions. She learned how to fly up/down using pg up/down. When she forgot to press the fn key, she moved her character, but did not realize that was the right command until the experimenter stepped in.	
Severity or Benefit: ***Rating:*** 5 usability catastrophe **Justification (Frequency, Impact, Persistence):** ***Frequency:*** rare, only new users not experienced with 3D environments ***Impact:*** extremely difficult to overcome alone ***Persistence:*** does not persist ***How these factors are weighted and why:*** Even though the problem is rare and not persistent, it completely ruins the user's experience since very few things can be done without walking.	
Possible solution: For users who signed on for the 1st time, display unobtrusive tips about how to do things, for example, if the user moves by clicking "move to…" suggest using arrows. If the user is walking, suggest flying.	
Possible trade-offs: If pop-ups require confirmation to be removed, then it decreases the effective screen size and can pile up and become a nuisance to close. However, if pop-ups disappear automatically, they may close before the user has seen or read them.	
Relationships: JJ-TA-5	

No. ***JJ-TA-2***	**Problem/Good Aspect:** Problem
Name: Tried many methods to look for events	
Evidence: User tried to walk around and look for events in the environment, tried looking for a bulletin board in the environment, tried using the map, searching in the main search UI, and searching in the "events" tab before finding an event. Looked at several then settled on one but did not express a lot of interest.	
Criterion: 3. The user articulates a goal and has to try five or more things to find the solution. 5. The user does not succeed in a task. That is, when there is a difference between the task the user was given and the solution the user produced.	
Explanation: When asked to look for events, the user expected to find things by walking around in the 3-D world, since that is how you find events in the real world. She tried to think of possible real-world sources such as bulletin boards. When she has exhausted the 3-D environment, she looked for possibilities in the surrounding UI since that was the only other possible option.	
Severity or Benefit: ***Rating:*** 4 major usability problem **Justification (Frequency, Impact, Persistence):** ***Frequency:*** judging from the interviews and survey, this is a common occurrence among novice users ***Impact:*** difficult to overcome for the 1st time ***Persistence:*** one-time for finding events, but finding other things may be the same situation ***How these factors are weighted and why:*** It's something most new users deal with, and could happen when looking for other things. Since the correct solution isn't explicit, it would take a while for users to get used to, so it is a major usability problem	
Possible solution: Provide a physical help board in the 3-D environment to direct users to the appropriate places	
Possible trade-offs: Clutters the world and increases server load	
Relationships:	

No. ***JJ-TA-3***	**Problem/Good Aspect:** Problem
Name: Cannot find interesting things to do	
Evidence: When prompted to find something interesting to do, the user walked around, tried to interact with other users, looked that avatars and objects that were unusual, but did not find any activities she was interested in	
Criterion: 1. The user articulated a goal and does not succeed in attaining that goal within 3 minutes (then the experimenter steps in and shows him or her what to do--the next step).	
Explanation: The user expected the 3-D environment and other users to give clues to what people do and what can be done. However, the environment doesn't provide the needed guidance and the in-world users are not very responsive. Since the user did not have a clear idea of what she could do, she was not able to utilize the search feature.	
Severity or Benefit: ***Rating:*** 5 usability catastrophe **Justification (Frequency, Impact, Persistence):** ***Frequency:*** from interviews, frequently occurs with novice users ***Impact:*** high, since not being able to find activities prohibits the users from finding a purpose to use Second Life ***Persistence:*** persistent, since there isn't a really good method for just finding random things to do ***How these factors are weighted and why:*** Being frequent, high impact, and persistent, this is a usability catastrophe because it stops users dead in their tracks before they can find value in Second Life	
Possible solution: For a 1st time user, provide a service to recommend things to do or places to go based on a selection of interests. Inform the user where this service is so they can come back and use it later	
Possible trade-offs: The added work of filling out interests may deter users, especially if they already have a specific activity they came for	
Relationships:	

No. ***JJ-TA-4***	**Problem/Good Aspect:** Problem
Name: Cannot exit island	
Evidence: User tried to walk into the "exit" sign several times, and ultimately was not able to exit the island.	
Criterion: 2. The user articulates a goal, tries several things or the same thing over again (and then explicitly gives up).	
Explanation: The user was trying to explore her world to see if there's anything interesting to do. When she saw an exit sign above a rectangle, she expected the rectangle to be a portal (not a sign). Since the user did not master movement controls, when walking into the exit sign did not work, she assumed that it was because she didn't aim correctly and repeatedly tried the same thing.	
Severity or Benefit: ***Rating:*** 4 major usability problem **Justification (Frequency, Impact, Persistence):** ***Frequency:*** probably infrequent, as the sign gives a text description that explains what to do (which the user discarded by mistake) ***Impact:*** moderately difficult to overcome. The user can ask another Resident or use the map to teleport instead. ***Persistence:*** Not persistent. Once the user learns how to leave an island, he or she will be able to do so for other islands too ***How these factors are weighted and why:*** Even though it's not persistant and has a viable solution, not being able to exit the island dramatically decreases the user experience because it doesn't allow users to see all the other possibilities, therefore it is a major usability problem.	
Possible solution: Make the exit sign seem less like a door, or allow walking into the proverbial door	
Possible trade-offs: Changing such an experience will confuse users who are already accustomed to the old way	
Relationships:	

No. ***JJ-TA-5***	**Problem/Good Aspect:** Problem
Name: "Accept object" popup confusing	
Evidence: During several different occasions, while trying to interact with an object, the user received popups of whether they want to accept an object made by X. First ignored or rejected all requests, then accepted because she couldn't figure out how else to interact with the object.	
Criterion: 6. The user expresses hesitation, surprise.	
Explanation: Since the user expected an interaction with the object, she did not expect needing to accept something, since that usually happens with unsolicitated things. Therefore, when a popup asked her if she wants to accept an object from a user (it wasn't clear that the user name was the owner of the object she was interacting with), she thought it was spam (it was a popup) and declined it	
Severity or Benefit: ***Rating:*** 3 moderate usability problem **Justification (Frequency, Impact, Persistence):** ***Frequency:*** frequently, since this happens with all objects and new users are bound to be suprised ***Impact:*** moderate, after a few times the user will try to accept, which will lead to receiving the object ***Persistence:*** low, after the user realizes that the alert is associated with the object, they will have no trouble receiving objects ***How these factors are weighted and why:*** Interacting with object is the main way an avatar can interact with the surrounding world. The non-intuitiveness of this action greatly delays the rewards of the SL experience and may turn of a lot of users, thus it is a moderate usability problem	
Possible solution: Refer to the object when popping up the alert window, and animate so that the confirmation window pops up from the object so that they can be closely tied together	
Possible trade-offs: users still might have too strong of an association between popups and spam to understand the connection between object and popup	
Relationships:	

No. ***JJ-TA-6***	**Problem/Good Aspect:** Problem
Name: Inconsistent search results	
Evidence: Tried to search for a user under the main window, received no results. Tried searching only last name, no results. When searching only for last name in people tab, too many results.	
Criterion: 3. The user articulates a goal and has to try five or more things to find the solution.	
Explanation: Since last names are fairly unique in real life, the user tried using the same method in SL. However, the user did not know that SL last names are assigned, hence sometimes even more common than first names. The user was overwhelmed by the number of results per last name they saw	
Severity or Benefit: ***Rating:*** 3 moderate usability problem **Justification (Frequency, Impact, Persistence):** ***Frequency:*** fairly frequent. Our other TA user also had this problem ***Impact:*** Moderately difficult to overcome, but if the user looks at all the names available she will eventually arrive at the right one ***Persistence:*** very persistent, since the user may never find out that search by last name is not very productive ***How these factors are weighted and why:*** Since this problem could significantly slow down the user's SL experience and can persist, it is a moderate usability problem	
Possible solution: Give tips of better search practices if there's too many results	
Possible trade-offs: Tips usefulness can be hard to determine	
Relationships: JJ-TA-7	

No. ***JJ-TA-7***	**Problem/Good Aspect:** Problem
Name: Search interface inconsistent with expectations	
Evidence: Was surprised that the events and people tabs in the search window had nothing to display	
Criterion: 6. The user expresses hesitation, surprise.	
Explanation: After the user was presented with ambiguous results in the main search tab, she clicked on other tabs expecting that they will display topic-specific results. However, the search functions in each tab were not connected with the main tab, so no results were shown. The user took this to mean that nothing was found within those tabs	
Severity or Benefit: ***Rating:*** 3 moderate usability problem **Justification (Frequency, Impact, Persistence):** ***Frequency:*** fairly frequent. Also occurred with our other user ***Impact:*** fairly easy to overcome, since the user can go back to the main tab ***Persistence:*** fairly persistent, since the user may never find out why the tabs were empty ***How these factors are weighted and why:*** This problem is fairly disruptive, but since it can be overcome by just using the main search interface, it is only a moderate usability problem	
Possible solution: Link the different search tabs so it looks for results from query from the other tab	
Possible trade-offs: May increase server load and lag	
Relationships: JJ-TA-6	

No. ***JJ-TA-8***	**Problem/Good Aspect:** Problem
Name: Cannot find friend on map	
Evidence: The add friend action indicates that you can find them on the map after adding, however, could not find newly added friend on map	
Criterion: 1. The user articulated a goal and does not succeed in attaining that goal within 3 minutes (then the experimenter steps in and shows him or her what to do--the next step).	
Explanation: The user added the friend expecting to be able to search friend on map, however, since the friend did not enable this, the user was not able to find the friend on the map.	
Severity or Benefit: ***Rating:*** 3 major usability problem **Justification (Frequency, Impact, Persistence):** ***Frequency:*** expected to be fairly frequent, since it was not clear that the other person had to authorize this feature for it to be available ***Impact:*** difficult to overcome. The users have to manually communicate or just teleport one person to find each other ***Persistence:*** one-time. Once they know the technicalities of the problem, it is easy to fix ***How these factors are weighted and why:*** This is a major usability problem because the system did not do what it promises to do	
Possible solution: Have a tooltip letting the user know that this feature is only available if the friend enabled it	
Possible trade-offs: Screen clutter	
Relationships:	

No. ***JJ-TA-9***	**Problem/Good Aspect:** Problems
Name: Cannot find friend after teleport	
Evidence: Offers to teleport friend, then nothing happens. Spends several minutes trying to find friend on map again, offers teleport again, finally asked friend where she was. Friend was teleported to behind the user.	
Criterion: 2. The user articulates a goal, tries several things or the same thing over again (and then explicitly gives up).	
Explanation: The user expected a notification of a successful teleport or an indication that the friend is now where the user is, but there was nothing. Since the user did not see a notification or see the friend, she assumed it was unsuccessful and kept trying to reteleport the friend, who is now directly behind her	
Severity or Benefit: ***Rating:*** 2 minor usability problem **Justification (Frequency, Impact, Persistence):** ***Frequency:*** probably infrequent, since the friend will probably start interacting with the user once she/he lands in the island ***Impact:*** easy to overcome, since either user can act to solve the lack of notification confusion ***Persistence:*** not persistent, since once the user knows the rules of the teleport, she/he won't expect a confirmation and will proactive ask the friend or look for the friend ***How these factors are weighted and why:*** This problem is minor because it is easy to overcome and only happens for first-timers. However, it can still be very frustrating. Therefore it's a minor usability problem.	
Possible solution: Notify the users that the friend was successfully teleported and have a red arrow point to the direction of the friend.	
Possible trade-offs: The user may be annoyed by the notification and may not understand the meaning of the arrow	
Relationships:	

No. ***JJ-TA-10***	**Problem/Good Aspect:** Problem
Name: Can't walk in straight line	
Evidence: User walks in zig-zags, falls off bridges,and expresses frustration at not being able to walk straight	
Criterion: 7. The user expresses some negative affect or says something is a problem.	
Explanation: Since there is a lag in the system, the user doesn't see the response from her keystrokes until a delay later, causing the user to think she is not pressing the right button. The delay from command to action is long enough that the user could not syncronyze the two well enough to make use of the visual feedback of the avatar to control it better	
Severity or Benefit: ***Rating:*** 2 minor usability problem **Justification (Frequency, Impact, Persistence):** ***Frequency:*** moderate, could happen to some users, while others are well aware of the internet delay and are more patient ***Impact:*** difficult to overcome, because the lag practically demands that the user walks blind by going just by the feeling of if it should go this way ***Persistence:*** not persistent. Once they figure out how to walk by anticipating the lag, they will be able to move their avatar freely ***How these factors are weighted and why:*** The fact that such a basic skill in real life cannot be performed in SL frustrates the user. However, this only happens to some users, and does not completely prevent the user from doing other activites. Therefore, this is a minor usability problem	
Possible solution: Decrease the lag between command and movement	
Possible trade-offs: No tradeoffs	
Relationships: JJ-TA-1	

Appendix N — User 3 UARs

No. ***KDA -TA-1***	**Problem/Good Aspect:** Problem
Name: User thought finding a demo skin qualified as an activity	
Evidence: He said, "what's this, female demo skin?' He touched the demo's box, it gave him a card. He clicked 'accept' to get the demo then asked if he was finished with the task.	
Criterion: 5) The user does not succeed in a task. That is, when there is a difference between the task the user was given and the solution the user produced.	
Explanation: The user was completely unaware that the island he was on was not the only place in Second Life. He was oblivious to the UI and continued to look for everything in world when he was on an island that only had shopping and camping. The task did not qualify editing the avatar's appearance as an activity and he did not recognize camping as one.	
Severity or Benefit: ***Rating:*** 3, major usability problem **Justification (Frequency, Impact, Persistence):** ***Frequency:*** Common for new users. Without a tutorial, or the willingness to sit through one, the new user will look to what is in front of them. ***Impact:*** Difficult to overcome. If the user isn't familiar with the interface or the nature of Second Life, it may take them some time to discover how to proceed. ***Persistence:*** This is a one time problem as far as locating where to search for activities. No evidence is presented in this TA as to whether the user will be able to sort through the search results to find something that appeals to them. ***How these factors are weighted and why:*** In this case, Frequency and Impact are most heavily weighted. Because part of our focus is the new user experience, the difficulty to overcome is of great concern. Many users may not have the patience to overcome this hurtle before abandoning the program all together. This is at the core of the "What now?" problem.	
Possible solution: A brief walkthrough of the UI before accessing the 3D components of Second Life would help orient new users.	
Possible trade-offs: Users may not be willing to sit through a 2D tutorial before beginning the 3D experience.	
Relationships: none	

No. ***KDA -TA-2***	**Problem/Good Aspect:** Problem
Name: Confused advertisement for avatar	
Evidence: The user walked up to an advertisement for women's clothing and began to ask it questions via IM. After two IMs, the user said "Oh!" and walked away.	
Criterion: 6) The user expresses hesitation, surprise.	
Explanation: The user was trying to ask for help and began to ask questions of an advertisement. He quickly realized she was not 'live' and wandered off a little confused until he noticed the rest of the ads.	
Severity or Benefit: ***Rating:*** 1 **Justification (Frequency, Impact, Persistence):** ***Frequency:*** Moderate. It is easy to see how some users would become confused, but not all. ***Impact:*** Easy to overcome. The image is 2D and does not respond. Time or movement will reveal it for what it is. ***Persistence:*** A one time problem. Once the user realizes that it is an ad, they will not make the same mistake. ***How these factors are weighted and why:*** The effect is fairly light in all cases, leading me to conclude that this is a minor problem.	
Possible solution: Do not allow cut-out advertisements.	
Possible trade-offs: This would restrict user's freedom of expression, violating Second Life's credo.	
Relationships: **none**	

No. ***KDA -TA-3***	**Problem/Good Aspect:** Problem
Name: The user continually explored the island he was on for an event	
Evidence: The user continually searched the island for an event, reverting to this between other attempts (mainly asking other avatars). Some exerts from my notes: -when asked to find an event, the user again began to search the island for something that looked like an event -he continued to search the island, still no attention to the UI, remark "This is just like a video game except with no point." The user then said that he cannot find an event and was excused from the task	
Criterion: 2) The user articulates a goal, tries several things or the same thing over again (and then explicitly gives up).	
Explanation: The user expected everything to be in the 3D world and continually ignored the UI. He expected to be able to find evidence of these activities, people, and events in the 3D environment much like he would look in real life. It took him until the third task to consider using the UI.	
Severity or Benefit: ***Rating:*** 2, minor usability problem **Justification (Frequency, Impact, Persistence):** ***Frequency:*** Common for new users. Without a tutorial, or the willingness to sit through one, the new user will look to what is in front of them. ***Impact:*** Difficult to overcome. If the user isn't familiar with the interface or the nature of Second Life, it may take them some time to discover how to proceed. ***Persistence:*** This is a one time problem as far as locating where to search for activities. No evidence is presented in this TA as to whether the user will be able to sort through the search results to find something that appeals to them. ***How these factors are weighted and why:*** In this case, Frequency and Impact are most heavily weighted. Because part of our focus is the new user experience, the difficulty to overcome is of great concern. Many users may not have the patience to overcome this hurtle before abandoning the program all together. This is at the core of the "What now?" problem.	
Possible solution: A brief walkthrough of the UI before accessing the 3D components of Second Life would help orient new users.	
Possible trade-offs: Users may not be willing to sit through a 2D tutorial before beginning the 3D experience.	
Relationships: KDA-TA-2	

No. ***KDA -TA-4***	**Problem/Good Aspect:** Problem
Name: The user could not locate the "friend" without teleport	
Evidence: -he first flew around the campers looking for the "friend" and tried to read names -he then flew around the island again -finally he noticed the UI and clicked the search option - he typed in "Clipper Chuzen" and found the friend's listing - he expressed frustration that the "find on map" option was not enabled - he then IMed Clipper who wrote back, he asked where clipper was and got back a description - he typed in the description (I believe "Japan bar island") but wasn't sure - he asked more questions via IM about where Clipper was - he went back to his search results and actually found the right place (he didn't know this yet) - he read the whole "ad" and selected teleport as the most likely option - he teleported - he then IMed Clipper and asked if it was night where she was, she said yes, look for the bar - he walked right pass the bar and wondered around until i took pitty on him and had Clipper offer teleport	
Criterion: 3) The user articulates a goal and has to try five or more things to find the solution.	
Explanation: The first physically looked for the friend on the island, then he searched for her where he tried to click "find on map". He then IMed her, asking where she was, he then searched for the description and finally teleported there. He then asked through IM exactly where she was and proceeded to search for her. He was finally offered a teleport to her location.	
Severity or Benefit: ***Rating:*** 2 **Justification (Frequency, Impact, Persistence):** ***Frequency:*** Common for new users. They do not know the in's and out's of the UI or how friendship affects visibility ***Impact:*** Easy to overcome. If the user is looking for a real friend and can IM them, that friend can tell them how to find them on the map. ***Persistence:*** This problem may persist if the user is always given a teleport instead of being told how o find someone on their own. ***How these factors are weighted and why:*** Even though this may be a common problem, Impact is weighted most heavily because it is low. Even if they are not Real Life friends with someone, most residents are very helpful and willing to aid new residents.	

Possible solution: A brief walkthrough of the UI before accessing the 3D components of Second Life would help orient new users.
Possible trade-offs: Users may not be willing to sit through a 2D tutorial before beginning the 3D experience.
Relationships: none

No. ***KDA -TA-5***	**Problem/Good Aspect:** Problem
Name: The user said Second Life had no point.	
Evidence: "This is just like a video game except with no point."	
Criterion: 7) The user expresses some negative affect or says something is a problem.	
Explanation: While attempting to complete task 2, the user became agitated after a table of avatars would not respond to him and remarked, "This is just like a video game except with no point." I believe that he felt this way because he had not accessed the search feature for an activity (a task he completed sub-optimally) and had remained on the island he was started on up to this point.	
Severity or Benefit: ***Rating:*** 4 **Justification (Frequency, Impact, Persistence):** ***Frequency:*** Common for new users. They have yet to find a lasting pull in Second Life. They often do not know anyone to introduce them to activities and events and may not know how to find them themselves. ***Impact:*** The impact varies from user to user. However, with some, the difficulty is extreme, causing them to loose interest in Second Life. ***Persistence:*** Because there are so many ways to find an event or activity and so many different kinds, it may be some time before a user finds a reliable source of activities/events that he/she will enjoy. ***How these factors are weighted and why:*** All three factors way equally in this case. This is a complex problem which varies from user to user, making it difficult to come up with a banket fix.	
Possible solution: Pay experienced residents to be guides to new users. Have them available within the first 30 days through a specialized call (perhaps a button). They can ask the user what they like and show them different things to do.	
Possible trade-offs: These residents will need to be paid. Also, some type of quality-assurance testing will have to be developed to ensure the residents are suitable guides. Even then, the guide and the user may not have matching personalities/interests.	
Relationships: none	

No. ***KDA -TA-6***	**Problem/Good Aspect:** Problem
Name: Found movement controls confusing	
Evidence: User stumbled with how to control the avatar. He would turn when he wanted to go left or right	
Criterion: 6 The user expresses hesitation, surprise.	
Explanation: The user thought that he needed to hit the left or right arrows in order to move in that direct. Instead it had him spinning in circles.	
Severity or Benefit: ***Rating:*** 4 **Justification (Frequency, Impact, Persistence):** ***Frequency:*** Common for new users. They often have difficulty with the controls. ***Impact:*** Great. It's very frustrating not to be able to move. It's the most basic requirement of experiencing the world. ***Persistence:*** Mild because he recovered after a few tries. ***How these factors are weighted and why:*** Impact is weighted most heavily because it is one of the first experiences users have in Second Life.	
Possible solution: Showing a mirror of how to operate the UI at first may give users a better idea of the appropriate action.	
Possible trade-offs: This will only clog the servers further, making Second Life less reliable.	
Relationships: none	

No. ***KDA -TA-7***	**Problem/Good Aspect:** Problem
Name: avatars not responding	
Evidence: The user attempted to ask for help by a group of campers who were not responding	
Criterion: 7) The user expresses some negative affect or says something is a problem.	
Explanation: While attempting to complete task 2, the user attempted to get advise from a group of campers. No one responded to his questions. I suspect that they were away from their computers.	
Severity or Benefit: ***Rating:*** 3 **Justification (Frequency, Impact, Persistence):** ***Frequency:*** Common for new users. They do not know the normal behavior in Second Life. ***Impact:*** The impact is great because the user feels he is being ignored, effectively shunning him from the community. ***Persistence:*** Tapering. This will decrease with time as the user learns about Second Life ***How these factors are weighted and why:*** Impact is rated most highly because of the importance of feeling like a part of the Second Life community.	
Possible solution: Only instructions about these types of situations could help	
Possible trade-offs: It's difficult to get users to read written instructions.	
Relationships: none	